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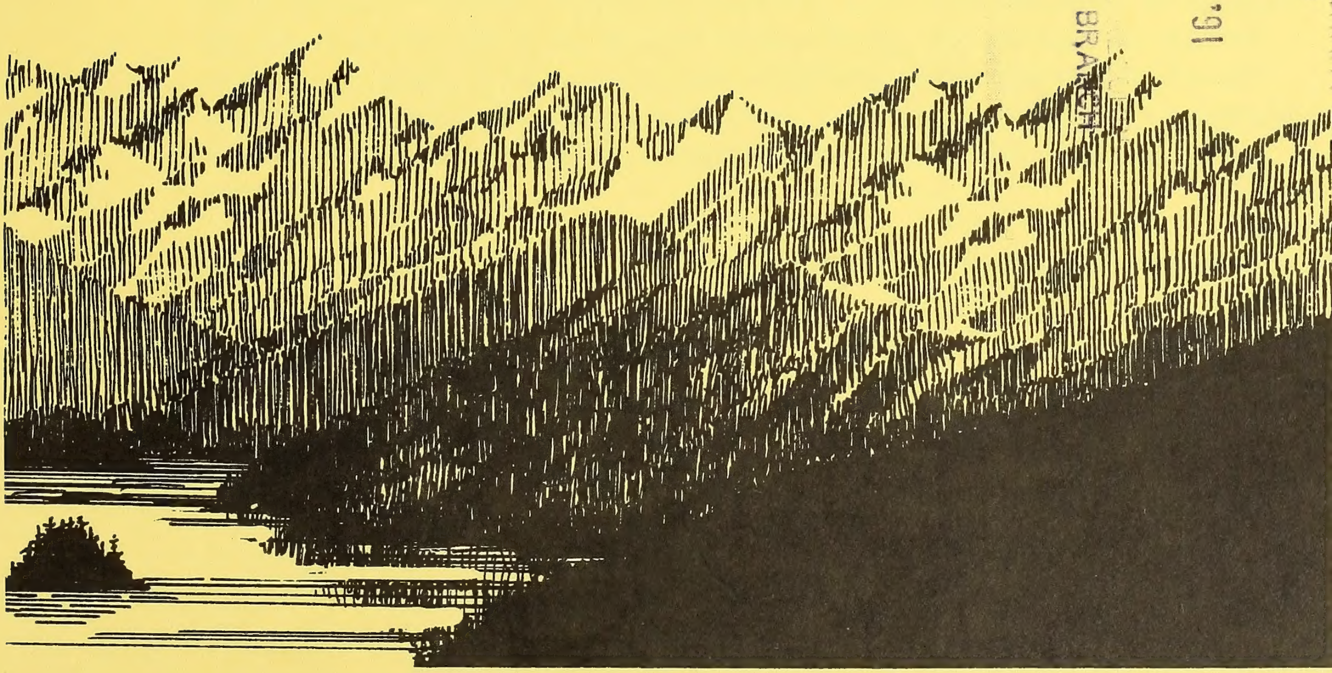
Tongass Land Management Plan Revision

Supplement to the Draft Environmental Impact Statement



SUPPLEMENT TO THE

DRAFT ENVIRONMENTAL IMPACT STATEMENT

TONGASS NATIONAL FOREST

LAND MANAGEMENT PLAN REVISION

ALASKA

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Abstract: This Supplemental Draft Environmental Impact Statement has been prepared for the revision of the Tongass Land Management Plan. It describes alternatives for managing the resources and uses of the Tongass National Forest, and discloses the potential environmental effects of implementing those alternatives. The revised Tongass Plan will direct all land management activities in the Forest. It will identify what land is to be managed for the different uses, and how the environment will be protected so these uses can be maintained.

Comments regarding this Statement should be sent to the Forest Plan Revision Office, at the address shown above, by December 6, 1991.

TONGASS FOREST PLAN REVISION

SUPPLEMENT TO THE DEIS

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Note: The Summary of the DEIS Supplement is published as a separate document.

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Purpose and Need

Chapter 1

Purpose and Need

Introduction

The 17-million acre Tongass National Forest, the largest forest in the National Forest System, was also the first to complete a Land and Resource Management Plan under the National Forest Management Act. The first revision of this plan is now being considered. A draft environmental impact statement (DEIS) documenting the environmental analysis for this revision, as required by the National Environmental Policy Act, was released in June 1990. In November 1990, the Tongass Timber Reform Act was passed. This Act imposed several new requirements for management of the Tongass which apply to the Forest Plan. This Supplement to the DEIS has been prepared to incorporate these requirements into the revision and environmental analysis.

Land and resource management planning is a process for developing, amending, and revising land and resource management plans (Forest Plans) for each of the National Forests in the National Forest System. Land management plans are required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA). The NFMA regulations require that forest plans be revised on a 10-15 year cycle (or sooner, if needed).

The Tongass National Forest Land Management Plan was adopted in 1979, amended in 1986, and amended again in 1991 for the Tongass Timber Reform Act. Because of changing values and increasing competition for the resources of Southeast Alaska, the Regional Forester for the Alaska Region initiated a plan revision in 1987. This Supplement analyzes in detail five alternatives for future management of the Tongass National Forest. A separate document, the Proposed Forest Plan, is an expansion of the preferred alternative (Alternative P) contained in this Supplement.

The actions preceding issuance of this Supplement have included identifying public issues (discussed later in this chapter and in Appendix A), developing criteria (guidelines) for use in assembling and analyzing data and information, and collecting and analyzing this data. The result was the "analysis of the management situation" (AMS) which examined, in detail, the historical trends, current situation, and supply and demand features of the resources and uses of the Tongass National Forest. (The Analysis of the Management Situation, Tongass National Forest, January 1990, is a separate document incorporated here by reference.) Both the public issues and the AMS have been updated based on analysis completed since passage of the Tongass Timber Reform Act (TTRA) and completion of the public comment period on the 1990 DEIS (see Appendixes A and B).

The Analysis of the Management Situation concluded with "the need for change," which looks at the Forest's current management direction in light of the analysis of public issues and resource information up to that point. It asked the question: "Is there a need to change or augment the existing direction?" Since the Tongass Land Management Plan is the existing direction, the need for change analysis helped identify what needed to be changed in the current

(1979) Forest Plan. The need for change, along with the public issues, defined the scope of the revision. The passage of TTRA required an updating of the need for change.

The purpose of the revised Tongass Land Management Plan is to direct all resource management activities on the Tongass National Forest. While the Forest Plan is expected to guide management of the Tongass National Forest for the next 10 to 15 years, the analysis in this Supplement to the DEIS, in order to display the potential long-term effects of the alternatives, covers a planning horizon of 50 years.

This environmental impact statement (EIS) is tiered to the EIS for the Alaska Regional Guide, which establishes Regional standards and guidelines and distributes targets from the Resources Planning Act program to the forests. Environmental analysis for projects will in turn tier to this, the Revised Tongass Land and Resource Management Plan EIS.

Following public review of this Supplement, public comments received on both the 1990 DEIS and the Supplement will be analyzed together, and a final Environmental Impact Statement (FEIS) will be prepared. The Regional Forester, in a Record of Decision, will select an alternative from the FEIS as the Tongass Forest Plan. Once adopted, the revised Forest Plan will supersede all current Tongass Forest Plan direction.

Changes Since the DEIS

This section highlights the ways in which the Supplement differs from the June 1990 Draft Environmental Impact Statement. The Tongass Timber Reform Act changed the land base significantly (with new Wilderness and other legislated areas for the Tongass), because of this, all the alternatives and some of the options within them (such as the choice of land use designations for certain areas) have changed. New modeling rules were needed to implement TTRA. The altered land base changed resource outputs, which in turn meant changes to the effects analysis for most resources. (The specifics of TTRA are discussed later in this chapter.)

Alternatives in the DEIS that were formulated primarily to evaluate various legislative proposals active at the time are moot and no longer being considered, since TTRA has resolved these proposals. In the Supplement, five alternatives, including a preferred alternative, are described and analyzed in detail. The alternatives themselves are formatted differently than those in the DEIS, and many additional alternatives, not described in detail, have been considered. Chapter 2 describes these alternatives.

Each resource section in Chapter 3 includes its own discussion of “changes since the DEIS.” Some of these are a result of TTRA, but many represent improved or expanded analysis, often as a result of public comments on the DEIS. Some of the major changes occur for Biological Diversity (discussion of ecological provinces), Minerals (analysis of undiscovered mineral resources), Old Growth (new definitions, and separation of volume classes 6 and 7), Recreation (expanded analysis, more distinction between different recreation types and settings), Special Interest Areas (14 potential areas have been identified), Subsistence (revised analysis and identification of important subsistence areas), Timber (analysis of TTRA requirements and revised supply opportunities), Visual Quality (more area-specific analysis), Wild and Scenic Rivers (suitability determinations made for the 112 eligible rivers), Wildlife (modifications to three habitat capability models and expanded analysis), and Social (more emphasis on effects by community, including subsistence effects).

Much of the Forest Plan information that was contained in appendixes to the DEIS is now in a separate document, the Proposed Revised Forest Plan. The management prescriptions, Forest-wide standards and guidelines, and monitoring plan have been revised (due to TTRA, information obtained from public comment, and internal review), the objectives expanded, and several resource schedules added.

The next two sections describe the need for change and the public issues, including changes since release of the DEIS. Additional sections explain the organization of the document and the planning record, and describe briefly the Forest and its location.

Need for Change

The need for change is based on the results of monitoring and evaluation, an assessment of current direction, resource supply potentials and projections of demand, and public issues and management concerns. Examples are: changes in market conditions or resource demands; shifts in public values; and new information about the Forest's resources and their interrelationships. The Tongass Timber Reform Act has altered the "needs for change."

Six categories of planning direction from the current Tongass Land Management Plan that might need changing have been identified (Chapter 7: The Need for Change, The Analysis of the Management Situation, Tongass National Forest, January 1990). These are described briefly here. (Please note: the following concepts are explained in more detail in Chapters 2 and 3.)

1. Multiple-use goals and objectives. The goals and objectives of the Tongass Land Management Plan were developed in 1979, and updated in 1986. Forest management is dynamic, and changes in public views, resource uses and demands, and natural resource knowledge require frequent re-evaluation of multiple-use goals and objectives.
2. Management Prescriptions. The current Tongass Land Management Plan uses four broad land use designations, with several variations, to allocate land areas to different types of management (such as wilderness, or emphasis on timber production). Specific management prescriptions, which have become the standard in more recent Forest Plans nationally, were not used in 1979. Such prescriptions (groups of coordinated management directions applied to specific areas of land) needed to be developed and evaluated for the Tongass.
3. Standards and Guidelines. Standards and guidelines specify how projects and activities are to be carried out to satisfy multiple resource needs. Resource management policies for projects and activities to be carried out under the current Tongass Plan were first contained in the Southeast Alaska Area Guide. Many of these later became region-wide standards and guidelines in the Alaska Regional Guide. Standards and guidelines have also been included in project implementation documents, and have been developed as a part of Regional direction in the form of handbooks, manual supplements and a Forest Plan amendment. The Tongass Plan Revision provides an opportunity to aggregate this direction into a Forest-specific package, and to validate, update and add to these existing standards and guidelines.
4. Timber Suitability. Under the Tongass Land Management Plan, lands were made available for a variety of uses including timber production. The methodology for determining the location of suitable lands for timber production (the "suitable" land base) was different than it is now. Revising the Forest Plan provides an opportunity to better identify suitable lands for timber management using current methodology.
5. Allowable Sale Quantity. The current Tongass Plan established an allowable sale quantity (a decadal ceiling on the amount of timber that can be supplied). This quantity was designed to meet market demands in Southeast Alaska, and to provide a significant contribution to Southeast Alaska's employment and local community stability while meeting multiple-use resource goals.

   Demand for Southeast Alaska's timber is expected to remain high during the 1990's. However, during the same period a decrease is likely in the timber supply from Native Corporation lands, increasing the demand for National Forest timber to maintain timber-related employment. At the same time, in recognition of the needs of some non-timber

resources, and in response to public issues, the maintenance or even reduction of current harvest levels needs to be considered. Both higher and lower allowable sale quantities are being evaluated.

6. Monitoring and Evaluation. The current Tongass Plan provides direction for monitoring and evaluation, primarily for monitoring development-related activities. A revised monitoring plan is needed to ensure that the revised management prescriptions and standards and guidelines are achieving the desired results.

Several requirements of the Tongass Timber Reform Act (November 1990) have meant changes in both the current Forest Plan and in the revision of that plan, including the consideration of alternatives. These are highlighted briefly here, and are discussed in more detail elsewhere in the documents (see Chapter 3, especially the sections titled "Fish," "Roadless Areas," "Timber," and "Wilderness"; and the Proposed Plan, Chapter 5).

1. TTRA mandates a no-harvest zone, or buffer, of at least 100 feet on either side of all Class I streams, and of all Class II streams which flow directly into Class I streams. This required changes to the two "riparian area" prescriptions (Stream and Lake Protection, Fish Habitat and Water Quality Requirements), and adjustment of the tentatively suitable land base.
2. Five new Wildernesses were created, and a sixth expanded, for a total of 299,696 acres (Revision data base, Query 1006A, June 1991). Most of these areas contained lands previously identified as tentatively suitable for timber management, but which are now not available. This and the next item change the land base, and some of the options, for all the alternatives.
3. Twelve other areas, totaling 727,765 acres (Revision data base, Query 1006A, June 1991), were given a permanent "Land Use Designation II" status, to be managed in an essentially roadless condition with no commercial timber harvest allowed. Many of these areas also contain lands previously identified as tentatively suitable for timber management.
4. With the two previous requirements, and since TTRA was the result of a compromise between different legislative proposals for the Tongass, the question of additional Wilderness for the Tongass has been settled, at least for this planning period. Therefore, alternatives considering different amounts of Wilderness and different legislative proposals are no longer being considered for this Revision.
5. TTRA requires that all additional logging under the two long-term sale contracts be accomplished so that the percentage of volume class 6 and 7 timber (that is, the higher-volume stands) currently existing within an area is not reduced. "Area" is defined as the 141 management areas established by the current Forest Plan, as amended. Timber harvest scheduling and modeling needed to be adjusted to reflect this requirement.

Public Issues

In 1988, after extensive public involvement, the public issues were identified. (See Appendix A for a description of issue identification and a discussion of each issue.) Ten issues related to the Tongass Plan revision were condensed from over 600 responses of individuals, businesspersons, representatives of special interest groups, and officials holding positions in either State or community governments. The majority of these responses came from within Southeast Alaska. The ten issues are described briefly here.

Between June 1990 and January 1991, over 3,800 responses were received on the DEIS, from a similar cross-section of individuals and groups. A summary of what these people said is included in Appendix A. How these comments have modified the ten original issues is briefly

discussed for each issue (under "Update"); no new issues surfaced as a result of these comments.

Since the 1988 issue identification, the inventory and evaluation of potential additions to the National Wild and Scenic Rivers System has become important for the Tongass. Eligible rivers have been identified, and their suitability by alternative is being considered.

Scenic Quality

What areas of the Tongass National Forest should be managed to emphasize scenic resources?

The Tongass National Forest is a unique combination of land and marine environments that provides outstanding ocean, mountain and glacier scenery. This scenery alone attracts thousands of visitors each year, who view Southeast Alaska from cruiseships or ferries traveling the popular Inside Passage water route.

Tourism has become a major industry in Southeast Alaska, similar to timber harvest and commercial fishing in the number of people directly employed. Tourism has helped diversify the economies of some communities. The Forest's outstanding scenery also provides the backdrop for local living and recreation.

Maintaining the scenic quality of the Forest landscape, and how this is to be achieved in combination with resource uses that alter natural landscapes, such as timber harvesting and road construction, is of concern to Forest visitors, individuals, groups, businesses and communities.

Update. The issue remains unchanged. Some commenters mentioned the scenic importance of specific areas; many were concerned with the views from the Alaska Marine Highway and cruiseship routes.

Recreation

What areas should be managed to emphasize recreation opportunities?

Dense spruce and hemlock forests, active glaciers, abundant fish and wildlife, and miles of protected waterway, combined with the vast size and remote character of the Forest, provide a truly unique natural setting. Roads and trails are few and tend to be concentrated around communities.

Outdoor recreation opportunities offered by the Tongass National Forest play an important role in the quality of life for the majority of Southeast Alaska residents. Many families have favorite places where they fish, hunt, beachcomb, hike, or just go to get away.

Forest management has the potential to alter some of these unique recreation settings, raising the question of the compatibility of activities such as timber harvesting with the recreation opportunities that these settings provide.

Update. The issue remains unchanged. Many commenters identified specific areas where they would like to see recreation emphasized (such as near Juneau, areas on north Chichagof Island, Kuiu Island, Blind Slough on Mitkof Island, areas on Prince of Wales Island, and the Cleveland Peninsula). Some felt the analysis of potential recreation changes and effects could be improved.

Fish Habitat

What methods should be used to protect resident and anadromous fish habitat?

The fisheries resource of the Tongass contributes significantly to the economic, recreational, and subsistence needs of residents and non-residents alike. Most of the salmon caught in the waters of Southeast Alaska and in the Gulf of Alaska, originate in streams and lakes lying within the boundaries of the Tongass National Forest.

Stream habitat provides shelter, hiding places, food, and rearing areas for Alaska's salmon. Changes in stream habitat can alter a stream's ability to produce fish. The level of protection necessary to maintain or enhance the fisheries resource, while allowing other resource activities such as timber harvest, is the focus of this issue.

Update. Many commenters requested that minimum stream buffers, as included in several legislative proposals and recommended by certain agencies, be used. Due to the Tongass Timber Reform Act, these stream buffers are now mandated. Effects from activities occurring outside the buffers remain a concern with some commenters.

Wildlife Habitat

What amount of old-growth and undeveloped habitat should be managed for the protection of wildlife?

The Tongass National Forest supports a wide variety of wildlife species, including the largest populations of brown bears and breeding bald eagles in the world. The Tongass is also unique with its many marine mammals and seabird colonies. Many species, which are endangered elsewhere in the United States, are abundant in the Tongass.

Alaskans and visitors engage in sport hunting of moose, brown and black bears, mountain goat, and deer, as do subsistence users. Many species of furbearers, waterfowl, upland game birds, and small game also provide the public with sport, commercial, and subsistence use opportunities. Demand is also growing for opportunities to watch and photograph wildlife.

The habitat needs of the wildlife species of the Tongass, the majority of which are associated with old-growth forests, must be integrated with the management of other resources. Old-growth forests of the Tongass also contain much of the high-value timber resource. The issue is how to manage forested habitats for competing wildlife and timber uses.

Update. The focus of this issue has changed slightly, with more emphasis on the "high-volume" component of old growth. Many public comments mentioned the importance of high-volume old growth, and were opposed to the disproportionate harvest of high-volume stands. The Tongass Timber Reform Act requires proportional timber harvest within the long-term sale areas. Other aspects of this issue are the total amount of old growth to be protected, and the size and location of blocks of old-growth forest to be retained.

Subsistence

What should the Forest Service do to continue providing subsistence opportunities?

Subsistence is hunting, fishing, trapping and gathering natural resources to provide needed food, and often to supplement rural incomes. For Southeast Alaska's Native Americans, subsistence is much more: it is a lifestyle that preserves customs and traditions, reflecting deeply-held attitudes, values, and beliefs.

Because commercial fishing and many timber harvesting employment opportunities are seasonal and cyclical, subsistence use of resources is important to many Southeast Alaskans. Land-disturbing activities can provide new access opportunities, which can in turn result in competition among sport and subsistence users. Some subsistence users like the new access; some do not.

As with many of the other issues, the subsistence issue revolves around ensuring subsistence opportunities and protecting traditional subsistence areas while managing for multiple resource uses.

Update. The issue remains unchanged. There was general concern among commenters over the effects of continued logging on resources important to subsistence users. Some

commenters felt that specific areas important to subsistence users had not been adequately identified or analyzed for effects.

Timber Harvest

What areas of the Tongass should be managed to emphasize timber harvesting?

In the 1950's, establishing an Alaskan timber processing industry was encouraged to promote stable year-round employment. To make this proposal economically viable, long-term timber sale contracts were established.

Congress helped ensure a supply of timber to the purchasers of these contracts and to independent contractors when it passed the Alaska National Interest Lands Conservation Act (ANILCA) in 1980. ANILCA provided for the availability of 4.5 billion board feet of timber each decade from the Tongass National Forest; this is the decadal ceiling allowed under the current Tongass Land Management Plan.

The issue of where to emphasize (or allow) timber harvest is many-faceted, and includes consideration of the compatibility of timber activities with other resource uses and needs, the identification of lands suitable for timber management, and the question of what is an appropriate, sustainable level of timber harvest - all in combination with the local economic importance of timber-related employment.

Update. The issue has not changed. One provision of the Tongass Timber Reform Act eliminates the ANILCA 4.5 million board foot requirement, replacing it with the goal of seeking to supply an amount of timber to meet market demand. The effects of timber harvest on other resources, and the economic benefits of the timber industry to Southeast Alaska, are still concerns of many commenters.

Roads

What road system should be developed in the Tongass National Forest?

The land transportation system in Southeast Alaska has evolved almost entirely from the need to access areas for timber harvest. Some of these roads linking island communities have more recently been upgraded and incorporated into the State Highway System, a trend expected to continue in the future. In some areas, such as Prince of Wales Island, transportation networks have been developed between log transfer facilities (used to transfer logs from land to water transport) and existing communities.

Roads have also become a popular means of access for recreation, hunting and subsistence uses. On the other hand, roads can adversely affect scenic quality, wildlife habitat, unroaded recreation, and other aspects of a natural environment. Future road development will still be primarily in support of timber management. The benefits and drawbacks to extending the road system in the Tongass need to be analyzed.

Update. The issue has not changed. One related concern among commenters is that the potential for future major transportation links with Canada not be unduly restricted through the land allocations made by the Forest Plan.

Minerals

What areas and accessibility should be emphasized for exploration, development, and production of mineral resources?

The Tongass National Forest contains immense mineral resources. Minerals that occur on the Forest range from precious metals to chemical-grade minerals. Mining and mineral exploration are not new to Southeast Alaska. In fact, mining activities have occurred for over one hundred years. Today, along with new explorations, many historical mineral deposits are being revisited. This renewed interest in mining could, directly or indirectly, provide a significant increase in employment in Southeast Alaska.

While mining is allowed under most categories of forest management, those that emphasize natural settings and undeveloped areas would be more restrictive: in the case of designated Wilderness, mineral development may not be allowed. The identification of areas with high mineral development potential, and assuring development opportunities where appropriate, are the major facets of this issue.

Update. The issue has changed to include concerns over the potential environmental effects of mineral development. Many commenters were also concerned with the use of the minerals "prescription" (land use designation) in the DEIS alternatives, most being opposed to its use, especially in the Juneau area.

Roadless Areas

What areas and what amount of roadless lands should be recommended for Wilderness Designation or other types of unroaded management?

One of the major issues identified in the 1979 Tongass Land Management Plan related to how much land and which areas should be formally designated as Wilderness. Some organizations and individuals considered Alaska to be one of the Nation's last opportunities to preserve large tracts of lands that were relatively untouched by human activity. Others felt that resource development should be permitted and that Wilderness designation would only "lock-up" valuable resource development opportunities.

Approximately 5.5 million acres of the Tongass were added to the National Wilderness Preservation System in 1980 (by the Alaska National Interest Lands Conservation Act). Today, with the abundance of unroaded lands in the Tongass, the amount and location of possible additional Wilderness continues to be an issue. Several roadless areas have been identified by the public, or in Congressional proposals, for consideration as wilderness. There are also opportunities to apply other types of management to these areas and still maintain their roadless character and values.

The issue centers on the question of how much roadless land to maintain in its natural condition, versus the development of these lands for their timber and mineral values.

Update. The Tongass Timber Reform Act designated many of the roadless areas contained in the various Congressional proposals to either Wilderness or a perpetual "Land Use Designation II" category (with no commercial timber harvest allowed). Thus this issue has changed to the extent that these areas, among the most-often mentioned by the public, will remain in a roadless condition, and no additional areas are being considered for Wilderness for this Forest Plan revision (Congress having just made that decision). Land allocations of other specific roadless areas is still an issue.

Local Economy

What ways should National Forest Lands be managed to provide for the local lifestyles of Southeast Alaska communities?

Employment and income generated by the government sector, timber, fishing, mining, and tourism industries is critical to the social and economic well-being of existing and emerging Southeast Alaska communities. Some individuals also rely on subsistence use of Forest resources to provide needed food which is supplemental to their income. In some situations, a positive increase in the development of one industry or lifestyle may negatively affect another.

Dependency on the land and natural resources as part of one's livelihood is an economic fact of life throughout much of Southeast Alaska. Because of this dependency, management of the Tongass National Forest has been, and continues to be, closely tied to the issue of regional and community socio-economic development and structure. Minor changes in Forest programs can

sometimes cause major changes in community lifestyles; but maintaining current employment, especially in the timber sector, will require the development of more areas of the Forest.

Update. This issue remains unchanged. Timber-related employment was the concern of most commenters on this issue.

Organization of the Document

This supplemental draft environmental impact statement is organized into several chapters and appendixes. A Summary is published separately. Chapter 1, "Purpose and Need," describes the reasons for proposing a plan revision, and the reasons for doing a Supplement. Chapter 2, "Alternatives," describes the process used to develop alternatives, explains what the components of a Forest Plan are, discusses alternatives not considered in detail, and then describes in detail a preferred alternative and four other alternatives. Chapter 2 also includes comparisons of these alternatives based on the public issues and significant environmental effects.

The discussions of the "Affected Environment" and the "Environmental Consequences" are combined in Chapter 3, "Environment and Effects." This is done so that the environmental consequences (effects) of the alternatives on forest resources, and the background information needed to understand these consequences, are discussed together for each resource. The focus will be on significant effects, with the analysis centered on the public issues. The chapter begins with a general description of the Tongass National Forest.

The Supplement also includes a list of preparers, a list of agencies, organizations and persons receiving copies of the document, a bibliography, and a glossary (Chapters 4 through 7), and an index. Appendixes, contained in two separate volumes, give more background on planning actions (such as identifying issues), certain resources (such as roadless areas), and analysis and modeling techniques.

A separate document, the Proposed Revised Forest Plan, is an expansion of the preferred alternative (Alternative P) in the Supplement. Along with the goals and objectives, it includes proposed resource schedules, a detailed description of the management prescriptions and Forest-wide standards and guidelines (these are applicable to all alternatives in the Supplement), information on implementation, and a monitoring and evaluation plan.

The Planning Record

Additional information, maps and documents used in the Tongass National Forest Land Management Plan revision process are contained in the planning record. These may be reviewed at the Tongass Plan Revision Team Office, 8505 Old Dairy Rd., Juneau, Alaska, during regular business hours. The planning record in its entirety is incorporated here by reference.

Forest Location and Description

The 17-million acre Tongass National Forest is located in Southeast Alaska, a part of the Alexander Archipelago, and occupies about seven percent of the State's area. The Tongass extends from Dixon Entrance in the south to Yakutat in the North, and is bordered on the east by Canada and on the west by the Gulf of Alaska. It extends approximately 500 miles north to south, and approximately 120 miles east to west at its widest point. Figure 1-1 is a vicinity map of the Tongass.

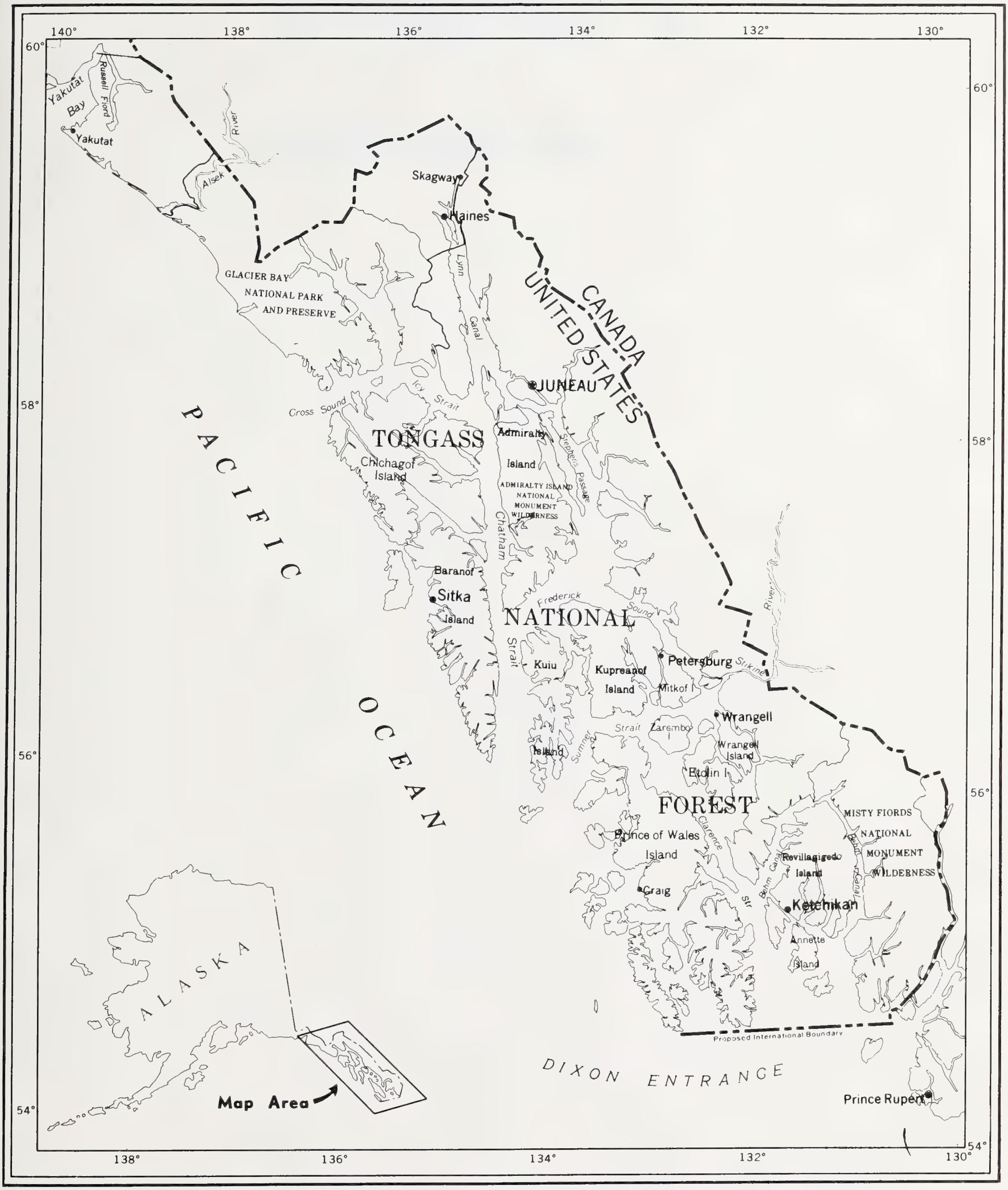
The Tongass includes a narrow mainland strip of steep, rugged mountains and icefields, and over one thousand offshore islands. Together, the islands and mainland equal nearly 11,000 miles of meandering shoreline, with numerous bays and coves. A system of seaways separates the many islands and provides a protected waterway called the Inside Passage. Federal lands comprise about 95 percent of Southeast Alaska, with about 80 percent in the Tongass National Forest (and most of the rest in Glacier Bay National Park and Preserve). The remaining land is held in State, Native and private ownerships.

Most of the area of the Tongass is wild and undeveloped. About 65,000 people inhabit Southeast Alaska, most living in 33 communities located on island or mainland coasts. Only eight of the communities have populations greater than 1,000 persons. Most of these communities are surrounded by, or adjacent to, National Forest land. Just three towns are connected to other parts of the mainland by road: Haines and Skagway to the North, and Hyder to the south.

The economies of Southeast Alaska's communities are largely dependent on the Tongass National Forest to provide natural resources for uses such as fishing, timber harvesting, recreation, tourism, mining and subsistence. Maintaining the abundant natural resources of the Forest while also providing opportunities for their use is a major concern of Southeast Alaska residents.

Because of its immense size, the Tongass National Forest is divided into three Administrative Areas, each with its own Forest Supervisor: the Chatham Area with its Supervisor's Office at Sitka, the Stikine Area with its Supervisor's Office at Petersburg, and the Ketchikan Area with its Supervisor's Office in Ketchikan (see Figure 1-1). There are nine Ranger Districts, with offices in Yakutat, Juneau, Hoonah, Sitka, Petersburg, Wrangell, Thorne Bay, Craig, and Ketchikan. There are also two National Monuments, Admiralty Island and Misty Fiords, with offices in Juneau and Ketchikan.

Figure 1-1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UNITED STATES
JUNEAU
Cross Sound
Icy Strait
TONGASS
Chichagof
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Admiralty
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ALASKA
Map Area
Proposed International Boundary
DIXON ENTRANCE
Prince Rupert

Chapter 2

Alternatives

Chapter 2

Alternatives

Introduction

The Council on Environmental Quality Regulations for implementing the National Environmental Policy Act describe the alternatives section (this chapter) as "the heart of the environmental impact statement." Chapter 2 is divided into five parts:

- a discussion of how alternatives were developed
- an explanation of what constitutes an alternative
- a discussion of alternatives considered but eliminated from detailed study
- a full description of the alternatives that are considered in detail
- and a comparison of these alternatives.

A large-scale map for each of the five alternatives considered in detail is included in the map packet accompanying this document. This map shows the locations of land use designations for each alternative. For ease of reading and brevity, the term "alternatives" will be used from now on to mean the alternatives considered in detail.

Alternative Development Process

The alternatives were developed using several factors, including the public issues and need for change discussed in Chapter 1, other information gained during the analysis of the management situation, and the goals of recent Federal programs and initiatives. The 1979 Tongass Land Management Plan (the no-action alternative) was the starting point, and is itself one of the five alternatives (Alternative C; see map packet). How these factors were used to develop alternatives (or used elsewhere in the plan revision process) is the subject of this section.

Public Issues

Most of the ten public issues center around particular forest resources (such as wildlife habitat), public uses (such as recreation or subsistence), or management activities (such as timber harvest).

In responding to issues through alternative land management plans, questions such as *"how much?"*, *"what?"* and *"where?"* can usually be answered in different ways. Land management planning may be compared to city, county or borough zoning. Just as areas in your community are zoned as commercial (allowing business uses), industrial (allowing factories) or residential (allowing only homes, schools, etc.), the forest is also "zoned" to allow, or not allow, various uses and activities. Land management zoning is done through the use of land use designations.

Land use designations (LUD's) are ways of managing an area of land and the resources it contains. LUD's may emphasize certain resources (such as Wilderness, or old-growth wildlife habitat), or combinations of resources (such as providing for scenic quality in combination with timber harvesting). Each land use designation has a detailed management prescription, which includes practices and standards and guidelines.

Practices are specific actions or treatments used in the management and protection of forest resources. As an example, even-aged timber harvest methods (clearcutting, for instance) are practices. Each management prescription specifies which practices are allowed to be c nsidered for site-specific project proposals. Some prescriptions may allow all types of timber harvest methods, some may allow only salvage due to insect or disease damage, and some may not allow timber harvest at all.

The prescription might specify, however, that timber harvest openings be limited to a certain size, or that the visible evidence of timber harvest be limited within frequently-viewed areas. These would be *standards and guidelines*. Some standards and guidelines, such as those for protecting archaeological sites, apply to all prescriptions. These are called Forest-wide Standards and Guidelines.

The land use designations are assigned, or "allocated," to specified areas of land (see alternative maps in the map packet). Many of the LUD's can be allocated differently (that is, assigned to different areas) depending on what issue or issues are being addressed. Under any one alternative, a given area of land will have only one LUD assigned to it. These allocations respond to the "what" and "where" kinds of questions. The alternative maps can be viewed next to each other to see different ways of allocating land use designations.

Forest products (such as timber) and resource uses (such as recreation) can be produced or made available in different amounts. How much timber to offer, or how many recreation users to provide facilities for, are questions that land management planning must also answer. Many resources, and many uses, may occur together in the Forest, but some uses or activities are not compatible. It is not always possible to produce all the products and uses in necessarily the amounts desired.

For instance, making a high level of timber available may preclude providing as many "undeveloped" recreation areas. Conversely, in an alternative where wildlife habitat is emphasized, timber harvest amounts may have to be lowered. "How much" of a given resource to produce or make available is another way to respond to issues by alternative. The discussion of the theme of each alternative begins in this chapter under the subheading, "Alternatives Considered in Detail."

Finally, alternatives themselves are usually designed around a "theme" that emphasizes a particular issue (such as the local economy) or a group of compatible issues (such as scenic quality and wildlife habitat).

Table 2-1 lists the primary land use designations that were used to develop alternatives in response to public issues. It also indicates when standards and guidelines and other specific considerations were used to respond to issues. Under "scope," those aspects of an issue that were emphasized by the public are highlighted. This helps to define the "decision space" (or range) within which the issue needs to be addressed.

The comparison of alternatives section at the end of this chapter also discusses ways in which the alternatives address the issues.

Table 2-1
Considerations used to develop alternatives

Issue	LUD Emphasis	Other Considerations	Scope
Scenic Quality	Scenic Viewshed, Modified Landscape, Primitive and Semi-Primitive Recreation	Standards and Guidelines	Emphasize area viewed by local residents and tourists.
Recreation	Scenic Viewshed, Modified Landscape, Primitive and Semi-Primitive Recreation	Standards and Guidelines, Recreation Places	Tourism and locally popular recreation areas.
Fish Habitat	Stream and Lake Protection, Fish Habitat and Water Quality Requirements	Standards and Guidelines, Improvement Projects	The economic, subsistence, and recreational aspects.
Wildlife Habitat	Old-Growth Habitat, Beach Fringe & Estuary, Stream & Lake Protection	Standards and Guidelines, Improvement Projects	The amount of old growth needed for wildlife and other resource uses.
Subsistence	Old-Growth Habitat, Beach Fringe & Estuary, Stream and Lake Protection	Standards and Guidelines	Providing for subsistence uses.
Timber Harvest	Timber Production, Scenic Viewshed, Modified Landscape	Targeted Harvest Level	Local timber markets and demand determine "upper bounds."
Road System	Same as Timber Harvest, plus Transportation and Utility Systems	Standards & Guidelines	Emphasize support of other uses.
Minerals	Minerals		Emphasize access to areas with high potential.
Roadless Areas	Primitive and Semi-Primitive Recreation		Consideration of non-development LUD's for areas with strong public support.
Local Economy	Some combination of those under Timber Harvest, Minerals, Fish Habitat, Scenic Quality, and Recreation.		Effects on local economies.

Need for Change

The "need for change" discussed in Chapter 1 identified six general categories of land management planning direction that may need changing, based on the results of the analysis of the management situation. *Goals* are the broad direction statements that focus a plan on a particular theme or emphasis.

Objectives are more specific, measurable items (such as outputs or activities) used to achieve the goals. The use of *management prescriptions*, and *standards and guidelines*, to respond to resource-related issues, has been discussed.

Timber suitability and allowable sale quantity, may be seen as ways to either respond to issues (the "where?" and "how much?" questions), or to management concerns over resource capability, and technical or economic feasibility. Timber suitability refers to the identification of lands where timber management may be practiced. Suitability depends in part on the allocation of LUD's that do not allow timber harvest; it also depends on the capability of an area to grow trees, either naturally or with the help of humans (reforestation), and on the economics of timber harvest. (Part of the determination of suitable lands does not vary by alternative, but has been updated from the 1979 Forest Plan. Timber suitability is discussed in Chapter 3, "Timber" and in Appendix A of the Proposed Revised Forest Plan.)

The allowable sale quantity (harvest level) also relates to the issues. It will vary by alternative according to whether the emphasis is on commodity issues (usually a higher sale quantity), resource-protection issues (usually lower), or a mixture of both.

Finally, *monitoring and evaluation* is the method of keeping track of how all the previous categories are working over time, as the revised Forest Plan is put into practice. In this case, monitoring does not vary by alternative, but a revised monitoring plan is included in the Proposed Revised Forest Plan.

Programs and Initiatives

Since the development of the DEIS in early 1990, several new federal programs or initiatives have either been released or have gained emphasis. These include the Strategic Plan for Forest and Rangeland Resources (1990 RPA Program), the President's "National Forests - America's Great Outdoors" initiative, and, from the Forest Service, the National Recreation Strategy, the Rural Development Strategy, and the New Perspectives initiative. This section presents an overview of these programs and initiatives, and explains some of the ways they influenced the Forest Plan Revision process and the development of alternatives. (Other initiatives have influenced the management of specific resources in the Alaska Region in recent years, and this influence is reflected in the Forest Plan revision as well. Although not discussed further here, these include: "Rise to the Future" (fisheries), "Get Wild" (wildlife) and "Windows on the Past" (cultural resources.)

New Perspectives

Overview. New Perspectives, since its announcement by the Chief of the Forest Service early in 1990, has received widespread interest, and many differing interpretations. For the Forest Service, New Perspectives is a management strategy for National Forest lands founded on ecological principles. New Perspectives stresses wise management, or stewardship, of the land based on four main guiding principles: sustainability, integration, participation, and collaboration.

- Sustainability refers both to keeping natural ecosystems intact, and to maintaining a sustained yield of forest products and uses.
- Integration refers to the coordinated management of the many resources and uses of the National Forests, and the use of resource protection measures for all affected resources when carrying out specific projects.
- Participation means continued efforts to better include individuals and organizations in natural resource planning and decision making.
- Collaboration means working together with various "partners" in accomplishing many of our natural resource projects and activities.

New Perspectives recognizes the need to emphasize and maintain the diversity of plant and animal communities and habitats throughout the National Forests, but also recognizes the diversity of human cultures, lifestyles and economies. New Perspectives stresses "outcomes" rather than "outputs:" what the forest should be like in the future, rather than how much of some particular resource it will produce.

Planning Process. An emphasis on natural ecosystem sustainability is a goal of several of the land use designations (LUD's), and of their allocations by alternative, including Wilderness, Primitive Recreation, Old-growth Habitat and Research Natural Areas. Other LUD's will help to sustain ecosystems on a smaller scale, and also contribute to natural diversity, such as Stream and Lake Protection, and Beach Fringe and Estuary. Forest-wide standards and guidelines for Biodiversity, Wildlife, Old-growth Forest, Riparian and Wetlands all recognize the importance of ecosystems. Sustained yields of forest products and uses are also goals of the LUD's, and are promoted through the use of management prescriptions and Forest-wide Standards and Guidelines.

The integration, or coordinated management, of forest resources and uses has been the major emphasis of the forest planning process. Each land use designation includes a coordinated set of standards and guidelines (the "prescription") for the different forest resources (as described more fully later in this chapter).

Participation of individuals and organizations in the development of the Forest Plan revision has also been an inherent part of the planning process (see discussions in Chapter 1 and Appendix A). Collaboration is more of a project-level activity and is not dealt with directly through the Forest Plan.

Natural diversity was mentioned above. Human diversity (of cultures, lifestyles and economies) is also recognized and is a goal of many of the LUD's (such as diverse recreation opportunities, timber production for local economic benefit, and scenic quality and its relation to tourism), and in Forest-wide Standards and Guidelines (Cultural Resources, Subsistence, Rural Development, etc.).

An example of emphasizing outcomes rather than outputs is the process used to assign the different LUD's to the Forest by alternative. LUD's were selected, using the theme of each alternative, based on how the resources were to be managed for the future, and on what opportunities to make available: on the desired future of the land, its resources, and its uses. In most cases, only after these selections were made (the "outcomes") were the levels of goods or services to provide (the "outputs") determined. For instance, harvest levels for each alternative were determined after the land use designations had been assigned, and only those suitable timberlands within the Scenic Viewshed, Modified Landscape or Timber Production LUD's were available for timber harvest scheduling.

1990 Resources Planning Act (RPA) Program for Forest and Rangeland Resources

Overview. An RPA Program is developed every five years, providing the overall emphasis for Forest Service programs. The 1990 RPA Program has four major themes for Forest Service multiple-use management:

- Enhancing recreation, wildlife and fisheries resources
- Ensuring environmentally acceptable commodity production
- Improving scientific knowledge about natural resources
- Responding to global resource issues.

Planning Process. Enhancing recreation resources is a major goal of several LUD's: Wilderness, Wilderness National Monument, Primitive Recreation, Semi-primitive Recreation and Modified Landscape. The identification and use of "recreation places," values, and community "home ranges" (see Chapter 3, "Recreation") assures that popular and accessible recreation resources are recognized. The fish resource will be enhanced through the use of the Stream and Lake Protection LUD, which applies to all streams. Wildlife resources are maintained and recognized through LUD's (such as Wilderness, Primitive Recreation, LUD II, Old-growth Habitat, and Beach Fringe and Estuary) and through Forest-wide Standards and Guidelines (Biodiversity, Wildlife, Old-growth Forest, and Threatened, Endangered and Sensitive Species). Also, all three resources have ten-year programs for developments and facilities (recreation) and habitat improvements (fish and wildlife) (see Proposed Plan, Chapter 3).

Environmentally acceptable commodity production has been discussed under New Perspectives. Improving scientific knowledge is largely a function of the Forest Service's Research branch; however, Research Natural Areas and Special Interest Areas offer opportunities for specific research studies (see also the "Information Needs" appendix of the Proposed Plan.) Responding to global resource issues, as they relate to the Tongass, is probably best seen in conjunction with the concepts of sustainability and diversity as discussed previously under New Perspectives.

National Forests - America's Great Outdoors

Overview. This Presidential initiative proposes increases in funding for the next three years to provide recreation, wildlife, fisheries and other benefits. The main areas of focus are:

- Recreation facilities maintenance and construction
- Interpretation and environmental education, emphasizing outreach to urban populations
- Special areas management, including Wild and Scenic Rivers, Scenic Byways, and Wilderness.

Planning Process. The ten-year recreation program (see Proposed Revised Forest Plan, Chapter 2), developed using these three areas of focus, includes year-by-year projects for both recreation facilities, and trails, construction and reconstruction. Cultural Resource and Recreation Forest-wide Standards and Guidelines include direction for interpretation and interpretive services. Special areas management is covered through LUD's for: Wilderness; Wild, Scenic and Recreation Rivers; and Special Interest Areas.

National Recreation Strategy

Overview. This is a program to bring more recognition of, and greater emphasis on, the recreation resources of the National Forests. For the Alaska Region, there are four primary goals for the recreation strategy:

- National Forest recreation will contribute to the economic diversity of Alaska and the Nation
- Recreation will be integrated with all other resources and activities, from project planning through implementation and monitoring
- User conflicts and polarization will be reduced
- Recreation resources management will be in balance with other National Forest programs.

Planning Process. The ways in which the recreation resource is recognized and integrated into forest and project planning, such as the applicable LUD's, the Forest-wide Standards and Guidelines, the ten-year recreation program, and the use of concepts such as recreation places, have already been discussed. Recreation has been one of the most-emphasized resources throughout the development of the Plan Revision and in the formulation of alternatives.

Rural Development Strategy

Overview. The decline in rural economies Nation-wide is of concern to the Forest Service. In Alaska, changes in land ownerships, uncertainties over federal timber harvest levels, and fluctuations in oil activities have contributed to this decline. The Region's Rural Development Plan identifies opportunities for enhancing rural economies through the management of National Forest resources. In addition, Forest Service interests and roles can go beyond National Forest boundaries. The Forest Service will be working with other federal, and State, agencies in a cooperative State-wide effort to foster rural development.

Some of the goals of the Rural Development Plan are to:

- provide for better understanding of the diversity of cultures and communities in Alaska, and the diversity of their needs
- consider local rural development as part of the decision-making process for the development and use of the resources of the Tongass
- form communication and cooperative networks of agencies, organizations, communities and other partners, and actively support and participate in the Alaska Rural Development Strategy.

Planning Process. An emphasis on rural development, in providing local economic opportunities, is a part of the themes of Alternatives B, C and D, and the Preferred Alternative, and each alternative includes a rural development goal and objective. Several of the LUD's recognize resources important to local economies, such as tourism (Scenic Viewshed and Modified Landscape), timber harvest (those two and Timber Production), fish (Stream and Lake Protection), mining (Minerals) and recreation (several). The Transportation and Utility Systems LUD recognizes present and future transportation and utility potentials. The Rural Development standard and guideline will assure consideration of rural development during project planning.

The Computer Model

The computer model (called FORPLAN) has the ability to evaluate, select and schedule a large number of resources and their "outputs" as they interact with or affect each other over time. This is done by associating a set of outputs (such as numbers of recreation users, or volume of timber) with units (acres, miles) of each management prescription. Output amounts can be specified for the model (such as setting the amount of timber available for harvest each decade), or selection can be left up to the model.

The full set of practices and activities that could be applied to the Forest were developed for use in FORPLAN. These are referred to as the FORPLAN prescriptions. The Forest was then divided into land units (Analysis Areas) to estimate the resource outputs and costs associated with the FORPLAN prescriptions. Delineation of Analysis Areas was based on physical and biological factors that determine timber harvest methods and practices.

Considering the capability and suitablity of the site, the full range of FORPLAN prescriptions that could be applied to each analysis area was then determined. Suitable practices and activities were defined as those that were feasible and would not cause permanent impairment of site productivity.

The results of the computer "runs" for each alternative were evaluated to ensure that the prescription allocation and the scheduling of resource outputs could actually be attained on the ground. Adjustments to FORPLAN constraints were made, when necessary, to produce a feasible output schedule and prescriptions that met the theme and goals of each alternative.

Using economic criteria, the computer model selects and schedules outputs. (Output levels can also be pre-set to meet non-economic criteria.) Each forest product or resource use has benefits and costs associated with it. When outputs are not pre-selected, and after minimum requirements are met (such as maintaining viable wildlife populations), those products and uses are selected that are the most economic to produce.

A level of public demand is also identified for many resource uses. Once the demand for a particular resource is met (for instance, the amount of recreation capacity that will accommodate future recreation use), that resource will no longer be selected based on additional "benefits." In other words, the model assumes that no benefit comes from producing more of a resource than is predicted to be needed.

Because it is not possible to assign dollar values to all Forest resource outputs and, hence, to include them all in the FORPLAN model, non-quantifiable benefits and costs such as the diversity of wildlife and fish species, the quality of recreation experiences, and the value of cultural resources were also considered. The evaluation of net public benefits (such as the combination of quantitative and qualitative resource benefits) was the final criterion used to formulate alternatives (see further discussion in the Economic Environment section of Chapter 3).

This has been a very simplified explanation of how the computer model works. The computer model is essential to formulating, testing, analyzing and evaluating Forest Plan alternatives. Appendix B discusses the modeling process in detail.

Benchmarks. "Benchmarks" were used for the Tongass Land Management Planning process. Benchmarks are simplified versions of forest plans, similar to alternatives, in that, like the alternatives, can be modeled mathematically and analyzed using a computer. The main difference between benchmarks and alternatives is in the level of detail, and in the single-resource emphasis of most benchmarks. The benchmarks were part of the analysis of the management situation, and are also described in Appendix B.

Summary of the "AMS"

The supply and demand situation for major resources of the Forest was evaluated during the "Analysis of the Management Situation" (AMS) in 1988 and 1989, and then reevaluated after passage of the Tongass Timber Reform Act (TTRA) (November 1990). The maximum potentials for supplying selected major resources, plus the actual supplies under the existing Forest Plan, were determined. Maximum and existing-Plan resource potentials were determined for timber (first-decade timber harvest), fish (anadromous fish), recreation, wildlife (old-growth habitat) and wilderness (from existing unroaded areas).

Potential resource maximums, subject only to meeting all legal requirements, were determined for each resource separately (they could not all be achieved together). Following TTRA, these were:

- A maximum first-decade annual harvest level of as high as 704 million board feet (after the Tongass Timber Reform Act).
- A commercial fish habitat capability increased to about 115 million pounds per year during the first decade.
- Recreation capacity increased to about 4.7 million recreation visitor days annually.
- A maximum old-growth wildlife habitat retained after the first decade of 8.7 million acres.
- A maximum of 10.4 million acres of unroaded lands could be designated as wilderness.

The production of these same resources under the current Plan (adjusted for TTRA) is:

- The maximum annual harvest level is 451 million board feet (after the Tongass Timber Reform Act).
- Commercial fish habitat capability is about 115 million pounds per year.
- Recreation capacity is 4.7 million recreation visitor days annually.
- The maximum old-growth wildlife habitat that could be retained after the first decade is 8.5 million acres.
- A maximum of 10.4 million acres of unroaded lands could be designated as Wilderness.

Supply and Demand. Resource potential (supply) is a general indication of how much of a particular resource might be available. Resource demand gives an indication of how much of a resource might be needed or desired. Resource demands are discussed in more detail in Chapter 3. A few key points are summarized here.

- Fish - The demand for commercial fish (about 95 percent of total demand) is expected to exceed current potentials for all species.
- Recreation - Recreation use is predicted to increase over the next decade, but will remain well below the Forest's current capacity of 4.7 million recreation visitor days.
- Wildlife - Hunting demand for most old-growth-related game species is predicted to increase over the next decade.
- Timber - Market demand is expected to remain strong over the next decade, with the share of National Forest timber expected to be at least two-thirds of the total harvest in Southeast Alaska.
- Wilderness - Additional Wilderness for the Tongass was considered during debate on the Tongass Timber Reform Act, which added 0.3 million acres of Wilderness to the Tongass (for a total of 5.8 million acres). No additional Wilderness needs are anticipated for the next decade.

Summary

Public issues, the need for change, the goals of Federal programs and initiatives, resource demands and potentials, knowledge of resource tradeoffs, and economic factors were all used to develop alternatives.

Alternative Construction

Each alternative for the revision of the Tongass Land Management Plan will be presented in the same format. This format includes the following components:

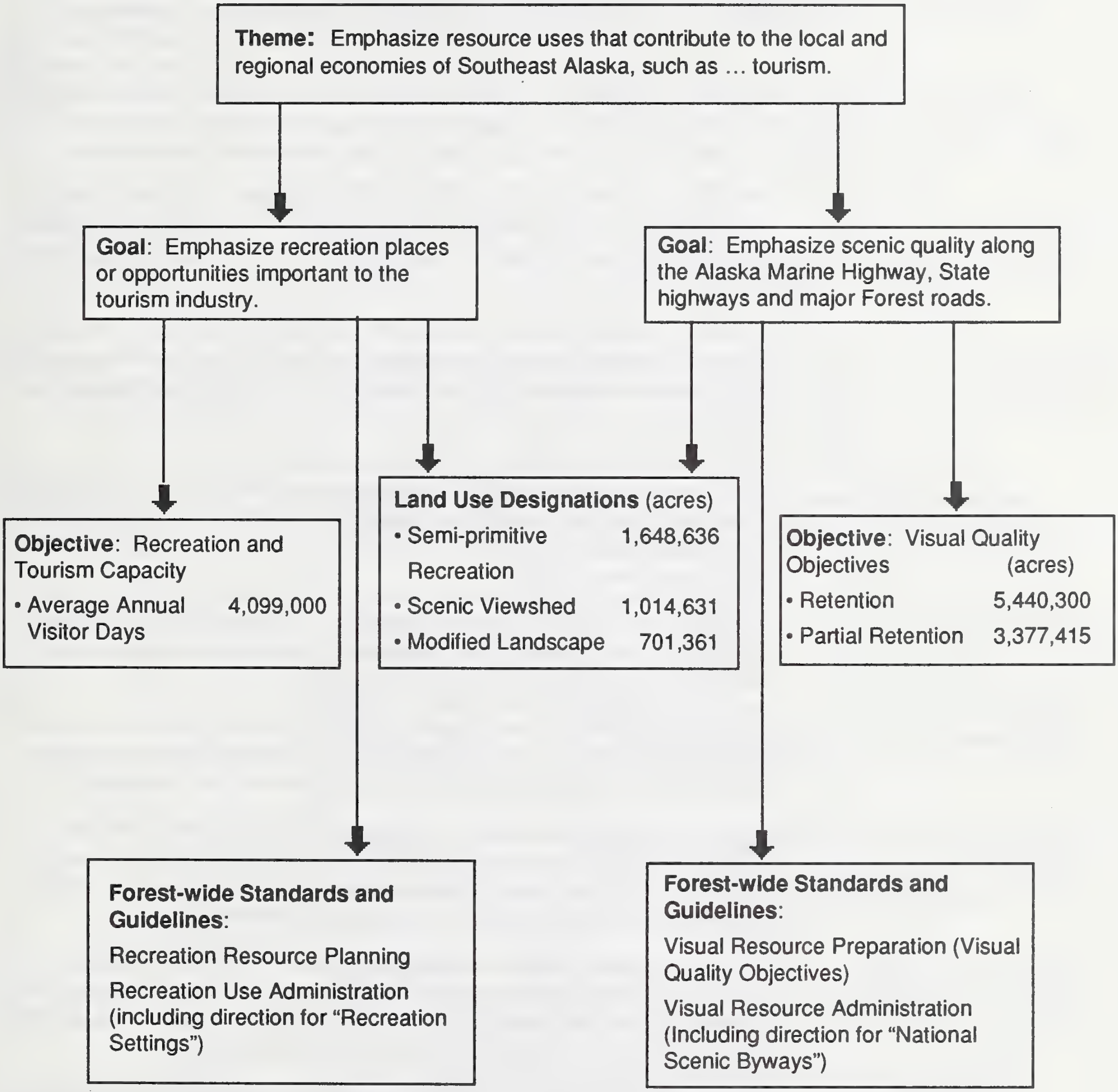
- Theme - The overall management intent and resource emphasis of the alternative.
- Goals - More specific statements of emphasis, by issue or resource.
- Objectives - Amounts of resource uses or forest products that will be provided on an annual basis, or that will be necessary to implement the alternative.
- Land Use Designations - The specific allocations (zoning) in acres, and on the alternative map of each land use designation (LUD).

Figure 2-1 shows of how these components work together. In Alternative B, one aspect of the *theme* is to emphasize tourism in support of the local economy. Figure 2-1 shows, in abbreviated form, how this theme is used in setting *goals* specifying objectives (outputs and activities), selecting l*and use designations* and formulating *Forest-wide Standards and Guidelines*. Remember that this is a simplified example and shows just one selected aspect of an alternative.

The theme, goals, objectives (outputs and activities) and land use designations are presented for each alternative later in this chapter. The management prescription for each Land Use Designation, and the Forest-wide Standards and Guidelines, will not vary by alternative. The proposed management prescriptions and Forest-wide Standards and Guidelines are included in the Proposed Revised Forest Plan (Chapter 4), and are not repeated here. Since they serve as the basic mitigation measures for individual projects under the revised Forest Plan, management prescriptions and Forest-wide standards and guidelines are discussed in the environmental consequences sections of Chapter 3. (Management requirements are also discussed in Appendix B.) Please keep in mind that the Forest-wide standards and guidelines, and each management prescription's practices and standards and guidelines are the full set of mitigation measures for each alternative.

Figure 2-1

Relationship of the Different Components of a Forest Plan Alternative[1]



[1] Based on selected portions of Alternative B related to tourism.

Land Use Designations

While the allocation of the land use designations will vary by alternative (that is, where the LUD's will be applied), the management prescriptions for each specific LUD do not change. The Proposed Revised Forest Plan includes the full set of proposed management prescriptions, with the exception of Fish Habitat and Water Quality Requirements, which is used for Alternative D only and is included as Appendix I.

In response to both public issues and the concerns identified during the analysis of the management situation, twenty-three different land use designations have been developed. These LUD's represent a wide range of allocation choices for managing specific areas of the Forest. They allow varying degrees of resource protection and development, from wilderness (no land-disturbing activities) to full commodity development (intensive timber harvesting or mining). A brief description of the overall goals for each LUD follows, and Table 2-2 compares some of the key provisions of each LUD in relation to issues and resources.

- Wilderness - Manage for the preservation of areas essentially unaffected by human use that provide outstanding opportunities for solitude, primitive recreation, and scientific and educational uses. Roads are not permitted and use of mechanical transport and motorized equipment is limited.

- Wilderness National Monument - Manage for the Wilderness portions of National Monuments that provide outstanding opportunities for solitude and primitive recreation and to protect objects of ecological, cultural, geological, historical, prehistorical, and scientific interest. Roads are not permitted and use of mechanical transport and motorized equipment is limited.

- Nonwilderness National Monument - Manage the nonwilderness portions of National Monuments to facilitate development of significant mineral resources to assure mining activities are compatible, to the maximum extent feasible, with the purposes for which the Monument was established.

- Research Natural Area - Manage areas for research and education and/or to maintain natural diversity on National Forest System lands. Current natural conditions are maintained insofar as possible. No timber harvest will occur.

- Other Area - Emphasize stewardship and protection of lands for which there is no other specific land use emphasis. Timber harvest generally does not occur and roads are normally present only when necessary to access adjacent land use designations.

- Beach Fringe and Estuary - Manage for natural beach fringe and estuary habitats, including windfirm old-growth conifer stands, cliffs, and beaches above the mean high-tide line. Timber harvesting is limited to salvage after catastrophic events. Roads associated with log transfer facilities may be located within the area.

- Primitive Recreation - Provide recreation opportunities and experiences outside Wilderness in unmodified natural environments where interaction with other visitors is infrequent, and the opportunity for independence and closeness to nature is high. Timber harvesting is limited to insect and disease control. Roads are absent.

- Enacted Municipal Watersheds - Manage enacted municipal watersheds to meet State Water Quality Standards for domestic use. No timber harvesting will be scheduled, but insect-infested and diseased timber may be removed under conditions which safeguard the quantity and quality of water. Roads are limited to administer the municipal watersheds.

- Old-Growth Habitat - Maintain old-growth conifer habitat in its natural condition to favor old-growth associated fish and wildlife resources. No timber harvesting will be scheduled and roads will be located outside the area when possible.

- Semi-primitive Recreation - Provide motorized and non-motorized recreation opportunities in natural and natural-appearing environments where interaction with others is low and the opportunity for independence and self-reliance is moderate to high. When present, roads are few and used primarily to expand and improve access to recreation opportunities or to permit access to other parts of the Forest and other ownerships. Timber harvest is limited to salvage of catastrophic events or beach log recovery.

- Land Use Designations II - Manage these Congressionally designated areas in a roadless state to retain the wildland character. Wildlife and fish habitat improvement and primitive recreational facility development is permitted. Timber harvesting is limited to insect and disease control. Roads will not be built except to serve mining and other authorized activities and vital Forest transportation system linkages.

- Experimental Forests - Manage to provide a variety of long-term opportunities for Forest research and demonstration areas. Timber harvesting will occur only for these purposes. Roads will be developed to facilitate ongoing research.

- Scenic Viewshed - Management activities are not visually apparent to the casual observer in the near distance from important land or marine travel routes, recreation sites, popular bays and anchorages. In the middle to background distance, activities are subordinate to the landscape character of the area. Timber harvest is allowed.

- Modified Landscape - Manage for a variety of uses. Management activities are subordinate to the visual character as seen in the near distance. In the middle to background distance, activities may dominate but are designed to be compatible with features found in the characteristic landscape. Timber harvest is allowed.

- Timber Production - Manage the area to maintain and promote industrial wood production. These lands will be managed to advance conditions favorable for the timber resource and for maximum long-term timber production. Roads are permitted.

- Minerals - Encourage the exploration and development of mineral resources in areas having high potential for mineral commodities including nationally-designated strategic and critical minerals. Until mineral activities are initiated, the area will be managed according to the underlying land use designation.

- Fish Habitat and Water Quality Requirements - Meet riparian management requirements of no serious and adverse effects to fish habitat and water quality. Timber harvesting will be allowed where not in conflict with protecting riparian-associated resources. Roads will be located outside the area to the extent practicable.

- Stream and Lake Protection - Maintain or improve fish and other riparian-associated resources. Timber harvesting is allowed where not in conflict with protecting riparian-associated resources. Roads will be located outside the area to the extent practicable.

- Special Interest Areas - Provide for the protection and interpretation of selected areas with unique archeological, historical, recreational, scenic, geological, botanical, zoological or palentological features. No timber harvest is scheduled. Roads will not be permitted unless compatible with management objectives.

- Wild Rivers - Maintain and improve the outstandingly remarkable values of river segments which qualify the river to be classified a Wild River. Shorelines are primitive and undeveloped. Timber harvesting is limited to insect and disease control. Roads are generally not present. Access is by trail, airplane or boat.
- Scenic Rivers - Maintain and improve the outstandingly remarkable values of river segments which qualify the river to be classified a Scenic River. Shorelines are largely undeveloped but may be accessible in places by roads. Timber harvesting is limited by the ability of the landscape to visually absorb the activity. Roads will be designed to be compatible with the landscape.
- Recreation Rivers - Maintain and improve the outstandingly remarkable values of river segments which qualify the river to be classified a Recreation River. Shoreline development may occur and the river may be readily accessible by road. Timber harvesting is allowed with priority to maintain existing and proposed recreation sites within the corridor. Roads are permitted.
- Transportation and Utility Systems - Emphasize existing and potential major public transportation and utility systems. Until transportation or utility systems are constructed, the area will be managed according to the underlying land use designation.

Table 2-2
Summary Comparison of Land Use Designations

Land Use Designation	Visual Quality Objective	Recreation Opportunity Spectrum	Access	Fisheries Improvement	Timber Management	Roads	Wildlife Habitats	Minerals Location &Leasing	Riparian
Wilderness (WW)	Preservation, Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open for Traditional Access	When Compatible with Wilderness Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Improved
Wilderness National Monument (WM)	Preservation, Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open for Traditional Access	When Compatible with Wilderness Monument Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Improved
Nonwilderness National Monument (NM)	Retention, Partial Retention, Modification, Maximum Modification	Primitive, Semi-primitive Motorized and Non-motorized, Roaded Natural, Roaded Modified	Open for Traditional Access	When Compatible with Nonwilderness Monument Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Generally Maintained or Improved
Research Natural Area (RA)	Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open, Restricted	When Compatible with RNA Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Improved if Compat-ible with RNA Objectives
Special Interest Areas (SA)	Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open	When Compatible with SA Objectives	Not Suitable	Case-by-Case Basis	Natural Distribution and Abundance of Habitat	Open, or With-drawn, Subject to Valid Existing Rights	Maintained or Improved if Compat-ible with SA Objectives
Other Areas (OA)	Retention, Partial Retention, Modification, Maximum Modification	All	Open for Traditional Access	Allowed	Not Suitable	Case-by-Case Basis	Natural Distribution and Abundance of Habitat	Open	Maintained or Improved
Primitive Recreation (PR)	Retention	Primitive	Open for Traditional Access	When Com-patible with Recreation Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Open	Maintained or Improved
Enacted Municipal Watersheds (MW)	Retention, Partial Retention, Modification, Maximum Modification	All	Open, Restricted	Generally Inconsistent	Not Suitable	Administrative Access on Case-by-Case Basis	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Improved

Table 2-2 (continued)

Land Use Designation	Visual Quality Objective	Recreation Opportunity Spectrum	Access	Fisheries Improvement	Timber Management	Roads	Wildlife Habitats	Minerals Location & Leasing	Riparian
Old-Growth Habitat (OG)	Retention	Primitive, Semi-primitive Motorized and Non-motorized	Open for Traditional Access	Allowed	Not Suitable	Case-by-Case Basis	Natural Distribution and Abundance of Habitat	Open	Maintained or Improved
Semi-primitive Recreation (SP)	Retention, Partial Retention	Semi-primitive Motorized	Open	When Compatible with LUD Objectives	Not Suitable	Limited Transportation Network	Natural Distribution and Abundance of Habitat	Open	Maintained or Improved
Land Use Designation II (L2)	Retention	Primitive, Semi-primitive Motorized and Non-Motorized	Open for Traditional Access	Allowed	Not Suitable	Case-by-Case Basis	Natural Distribution and Abundance of Habitat	Open	Maintained or Improved
Wild Rivers (WR)	Retention	Generally Primitive	Open for Traditional Access	When Compatible with LUD Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Withdrawn, Subject to Valid Existing Rights	Maintained or Improved
Scenic Rivers (SR)	Retention, Partial Retention	Semi-primitive Motorized and Non-motorized	Open	When Compatible with LUD Objectives	Selection, Limited Even-aged Harvesting	Limited Transportation Network	All Ages of Habitat with Minor Reduction in Amount of Old Growth	Open	Located in Designation SL
Recreation Rivers (RR)	Retention, Partial Retention, Modification	All	Open	When Compatible with LUD Objectives	Selection, Moderate Even-aged Harvesting	Full Transportation Network	All Ages of Habitat with Moderate Reduction in Amount of Old Growth	Open	Located in Designation SL
Experimental Forests (EF)	Retention, Partial Retention, Modification Maximum Modification	All	Open, Restricted	Allowed	Not Suitable, Range of Harvesting Varies with Research Needs	Full Transportation Network	Habitats Vary Depending On Research Activities	Open	Generally Maintain or Improve
Scenic Viewshed (SV)	Retention, Partial Retention	All	Open	When Compatible with Visual Objectives	Selection, Moderate Even-aged Harvesting	Limited Transportation Network	All Ages of Habitats with Slow Reduction in Amount of Old Growth	Open	Located in Designation SL

Table 2-2 (continued)

Land Use Designation	Visual Quality Objective	Recreation Opportunity Spectrum	Access	Fisheries Improvement	Timber Management	Roads	Wildlife Habitats	Minerals Location & Leasing	Riparian
Modified Landscape (ML)	Partial Retention, Modification	Roaded Natural and Modified	Open	Allowed	Group Selection, and Moderate or Intensive Even-aged Harvesting	Full Transportation Network	All Ages of Habitat with Slow Reduction in Amount of Old Growth	Open	Located in Designation SL
Timber Production (TM)	Modification, Maximum Modification	Roaded Natural and Modified	Open	Allowed	Intensive Even-aged Harvesting	Full Transportation Network	Early, Middle and Mature Habitats	Open	Located in Designation SL
Minerals (MM)	Modification, Maximum Modification	All	Open, Restricted	Allowed	Complete Range of Harvesting	Case-by-Case Basis	Habitats Vary Depending on Mining Development	Emphasized	Minimize Disburbance
Stream and Lake Protection (SL)	Retention, Partial Retention, Modification, Maximum Modification	Semi-primitive Motorized, Rural, Roaded Natural	Open	Encouraged	No Harvest, Selection, Moderate Even-aged Harvesting	Special Consideration	All Ages of Habitat with Majority of Old Growth Maintained	Open	Maintained or Improved
Fish Habitat and Water Quality requirements (WQ)	Retention, Partial Retention, Modification, Maximum Modification	Semi-primitive Motorized, Rural, Roaded Natural	Open	Encouraged	No Harvest, Selection, Moderate Even-aged Harvesting	Special Consideration	All Ages of Habitat with Majority of Old Growth Maintained	Open	Maintained or Improved
Beach Fringe and Estuary (BF)	Retention, Partial Retention	Semi-primitive Motorized and Non-motorized	Open	Allowed	Not Suitable, Second-Growth Management if Previously Harvested	Case-by-Case Basis	Natural Distribution and Abundance of Beach Fringe and Estuary Habitats	Open	Maintained or Improved
Transportation and Utility Systems (TU)	Retention, Partial Retention, Modification, Maximum Modification	Semi-primitive Motorized and Non-motorized, Roaded Natural, Roaded Modified	Open	Allowed	Not Suitable after Construction	Case-by-Case Basis	Habitats Vary Depending on Type of Development	Open or Withdrawn, Depending on Underlying Designation	Minimize Disturbance

Comparison to Current Forest Plan

The Current Tongass Land Management Plan uses four basic land use designations (LUD's), with several variations, to specify how areas of the Tongass National Forest are to be managed. Each land use designation has a common purpose and management implications describing how the land should be used. That plan has recently been amended (February 1991) to include requirements of the Tongass Timber Reform Act, one of which was the designation of certain areas for permanent "Land Use Designation II" management. This is a variation of LUD II, specifying the management of these areas as LUD II in perpetuity. A brief definition of the basic four LUD's (as used in the Current Forest Plan) follows (see further definitions in the glossary):

LUD I - Wilderness Areas managed as directed by the 1964 Wilderness Act, as amended by ANILCA.

LUD II - Roadless lands to be managed to retain their wildland character.

LUD III - Land to provide a combination of commodity and amenity values.

LUD IV - Land to be intensively managed for commodity or market resources.

In the Current Forest Plan, for the purpose of inventorying resources and interpreting resource values, the Forest was divided into areas called value comparison units (VCU's). A VCU is generally a distinct geographic area that encompasses a drainage basin containing one or more large stream systems, with boundaries usually following watershed divides. Value comparison units average approximately 18,000 acres; there were originally 867 for the Forest.

The main purpose of the Current Tongass Plan was to establish management direction for the Forest through the allocation of each VCU to one of the four Land Use Designations, and to make other planning process determinations. The VCU's were also grouped into 141 management areas, each with area-specific management direction and a schedule of management activities. Thus each value comparison unit has a particular management emphasis defined by the land use designation and the management area direction. The revision will not use VCU's for assigning land allocations, but they remain a useful unit for describing some environmental consequences, and have been retained for that purpose.

The development of more specific management direction beyond the basic land use designations was left to subsequent plan implementation decisions in the Current Tongass Plan. Management prescriptions for specific areas were to be developed as part of project or area plans (such as the five-year operating plans for the two long-term timber sale contract areas); these, plus Regional direction in the form of manual supplements and the Regional Guide, provided standards and guidelines for resource management and protection.

The primary changes in the proposed Revision are that the land allocations are now more specific, and that coordinated practices and standards and guidelines (the management prescriptions) are now included directly in the Revised Plan. The Revision will also eliminate the use of the 141 management areas and their associated activity schedules, with one exception. The management areas (but not the schedules) will be used for the Tongass Timber Reform Act requirement for proportional timber harvest (see explanations in Chapter 1, and in Chapter 3, "Timber").

To help understand the transition from the Current Tongass Plan's land use designations to the proposed land use designations, a comparison of the two is given in Table 2-3. The map packet also includes a map of the Current land allocations ("no action" alternative), which can be compared to the prescription map for Alternative C (the current management alternative). To

make comparisons with other alternatives and their environmental consequences easier, the full set of proposed (1991) land use designations will also be used to describe Alternative C (the "Current Plan Alternative - see map packet), as they are for the other alternatives.

Table 2-3 provides a comparison of the four Current Plan land use designations and the corresponding land use designations proposed for the revision as they are used in Alternative C. Since the Current Plan has no Wild, Scenic or Recreation Rivers, none are proposed for Alternative C, nor is the Minerals LUD used. Also, the Transportation and Utility Systems LUD has no acres associated with it and is not shown. It could occur in any Current Plan LUD. The acres for Stream and Lake Protection, and Beach Fringe and Estuary, apply to both LUD's III and IV. Due to the refinement of mapping capabilities using the GIS database, total Forest acres are about two percent higher than as calculated for the Current Plan. This increase shows for each LUD comparison as well.

Please note that the comparison given in Table 2-3 represents only an approximate correlation. In some cases, one of the 23 proposed LUD's may apply to more than one of the Current Plan LUD's. This was inevitable when going from broad categories to more specific ones. In assigning the LUD's to Alternative C, the intent of the Current Tongass Plan has been followed.

Table 2-3
Land Use Designations: Before and After

Current Tongass Plan Land Use Designation	Acres	Proposed Revision Land Use Designation	Acres
LUD I	**5,841,880**	Wilderness	2,672,603
		National Monument Wilderness	3,099,048
		National Monument Nonwilderness	159,372
		LUD I Comparison Total	**5,931,023**
LUD II	**4,736,350**	Research Natural Areas	37,697
		Primitive Recreation	3,132,379
		Special Interest Areas	7,893
		Old-Growth Habitat	367,421
		Enacted Municipal Watersheds	9,773
		Other Areas	0
		Land Use Designation II	727,765
		Semi-Primitive Recreation	557,171
		LUD II Comparison Total	**4,840,099**
LUD III	**2,304,320**	Experimental Forests	17,259
		Scenic Viewshed	680,081
		Modified Landscape	1,324,295
		Stream and Lake Protection	225,618
		Beach Fringe and Estuary	153,076
		LUD III Comparison Total	**2,400,329**
LUD IV	**3,824,450**	Timber Production	3,148,599
		Stream and Lake Protection	380,727
		Beach Fringe and Estuary	296,481
		LUD IV Comparison Total	**3,825,807**

Alternatives Eliminated from Detailed Study

Departure

Timber supply projections for lands in non-National Forest ownership show significant declines early in the first decade of Forest Plan implementation (the 1990's). One alternative (Alternative D) was developed to address this issue by increasing the timber supply from National Forest Land. A "departure" was not considered because several alternatives meet the long-term sale contractual requirements, plus historic independent-program levels and projected demand. To promote regional economic stability, non-declining even-flow was used for all alternatives. A departure would not promote long-term regional economic stability. The Forest has the capability to respond to market fluctuations, since allowable sale quantities are decadal constraints, not annual. (See the discussion of "non-declining even flow" in Appendix B).

Declassifying Designated Wilderness

The possibility of declassifying portions of Wilderness areas to make additional timber available for harvest was also considered. This would have been done to meet a goal for increasing the timber supply. Alternative D responds to long-term projected timber demand, thus declassifying portions of Wilderness was not considered further.

Alternatives Considered in Detail

This section presents the specifics of the five alternatives being considered in detail. Included are an alternative representing "no action" (the Current Plan, Alternative C), and four other alternatives (A, B, D and P) developed to respond differently to the issues and provide a range of choice for the decisionmaker and the public. Alternative P is the Forest Service's preferred alternative. Alternatives A through D correspond in theme and general emphasis to those same four lettered alternatives in the 1990 DEIS.

Since this is a revision of an existing Forest Plan, the starting point is that plan. The no action alternative (Alternative C; see map packet), or Current Plan, means that all current management direction would be continued. Current management direction includes the Current Tongass Plan, as amended, plus the other planning direction, project-type prescriptions, and standards and guidelines developed under the goals of that plan, or resulting from Forest Service policy decisions. The management prescriptions and Forest-wide standards and guidelines in this proposed revision have incorporated much of this "other planning direction."

Applying the prescriptions and standards and guidelines to the "no action" alternative is reflective of the direction under which the Forest is currently being managed. The Revision has offered an opportunity to assemble and refine this management direction in one place, and in a coordinated fashion, and to further analyze the resource choices that result. The main differences in alternatives are found in the way the land use designations are assigned, and the resulting changes in the amounts of forest products, uses and activities that will be provided.

Continuing with the four land use designations (LUD's) described earlier would have been truly "no change" from current management (see "No Action" Alternative map in the map packet). Assigning the land use designations to Alternative C to reflect, as closely as possible, the intent of the Current Tongass Plan and correspond, as closely as possible, to the original LUD's, makes alternative C comparable with the other alternatives and yet retains its character as the "no action" alternative.

Each alternative is presented in the same format, as discussed earlier. Included are the alternative theme, goals, objectives (outputs and activities), and a table indicating the acres allocated to each land use designation. Detailed descriptions of the management prescriptions (with their associated practices and standards and guidelines), and the Forest-wide standards

and guidelines, are contained in the Proposed Revised Forest Plan. These apply to all alternatives, and represent the full set of mitigation measures that are an integral part of each alternative. A map of each alternative is included in the map packet. Each map shows the areas to which the individual LUD's have been assigned.

The Forest Service follows a policy of "non-declining even flow" for timber harvest to ensure that a long-term sustained yield of timber will be available. This means that the amount of timber harvested in any one decade can not exceed that of any succeeding decade. Non-declining even flow is determined in cubic feet of timber volume, which is the measure used for long-term modeling purposes. The timber outputs for each alternative are shown in board feet, which is currently the more common measure, and in cubic feet.

The ratio of board feet to cubic feet changes from decade to decade, depending on the timber volume and size of timber harvested per acre, and because timber yield tables based on board feet and cubic feet are constructed independently (cubic feet being a better overall measure of usable wood). Therefore, the amount of board feet can vary, even decline, by decade while timber harvest measured in cubic feet remains constant.

Alternative A

Theme

The theme of this alternative is to emphasize high-quality fish and wildlife habitat, unroaded areas, wild, scenic, and recreation rivers, scenic quality, subsistence use, and a wide range of recreation and tourism opportunities in a natural setting. Timber harvest and mining may occur at levels compatible with the non-market emphasis of this alternative.

Goals

Rural Development

Maintain opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.

Visual Resource

Maintain visually appealing scenery Forest-wide. In areas where landscapes are being altered by management activities, limit extensive landscape modification.

Recreation

Provide a wide range of recreation opportunities in a natural setting, with emphasis on existing recreation places.

Fish Habitat

Maintain or improve the aquatic biological productivity of all anadromous and important resident fish streams and lakes (Class I). In less important resident fish streams (Class II), maintain habitat capability.

Wildlife Habitat

Maintain as much contiguous, undisturbed old-growth habitat as possible, with emphasis on identified high-value areas, for old-growth associated species to ensure the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Subsistence

Provide for the continuation of subsistence uses by all rural Alaska residents.

Timber Management

Manage the timber resource to provide for the production of sawtimber and other wood products where compatible with other resource goals. Manage timber on an evenflow, long-term sustained yield basis in the most economically efficient manner.

Transportation

Develop and manage roads as required to support resource management objectives. Allow the development of utility systems.

Minerals

Emphasize the development of mineral resources in areas where non-market values are not the primary emphasis. Require environmentally sound mineral exploration, development and reclamation in areas open to mineral entry while protecting other resource needs and values. Provide for the environmentally sound exercise of valid existing rights in areas otherwise closed to mineral entry. Seek withdrawal of areas where mineral development is not allowed by a specific land use designation.

Wilderness and Roadless Areas

Maintain a wilderness setting consistent with ANILCA on the 5.8 million acres of Wilderness on the Tongass. Manage most inventoried roadless areas to retain their undeveloped character, including those areas considered for wilderness in recent legislative proposals but not designated by Congress in the Tongass Timber Reform Act.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Research

Continue to seek out and promote research opportunities that are consistent with identified information needs.

Air

Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emission sources.

Soils

Maintain soil productivity, and minimize soil erosion resulting from land-disturbing activities.

Water

Provide water of sufficient quality to meet or exceed Alaska State Water Quality Standards for designated beneficial uses.

Riparian

Maintain or improve riparian-dependent resources consistent with existing laws and regulations.

Wetlands

Maintain wetlands and their associated functions and values to the extent practicable.

Objectives

Table 2-4A

Resource outputs, activities, effects and costs - Alternative A[1]

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Recreation Capacity (Recreation Opportunity Spectrum Classes)[3]			
Primitive, and Semi-primitive Non-motorized	M RVD's	1,394	[4]
Semi-primitive Motorized	M RVD's	1,296	[4]
Roaded Natural and Roaded Modified	M RVD's	1,341	[4]
Total	**M RVD's**	**4,031**	[4]
Trail Construction/Reconstruction[3]	Miles	7	[4]
Developed Site Construction/Reconstruction[3]	PAOT's	137	[4]
Visual Quality Objectives			
Retention	M Acres	6,097	6,097
Partial Retention	M Acres	3,497	3,497
Modification	M Acres	818	818
Maximum Modification	M Acres	850	850
Roadless Lands Remaining	M Acres	15,014	14,159
Wild and Scenic River Recommendations			
Wild	Miles	1,074	[4]
Scenic	Miles	155	[4]
Recreational	Miles	154	[4]
Research Natural Areas	Number	24	[4]
Special Interest Areas	Number	20	[4]
Experimental Forests	Number	1	[4]
Hunting and Fishing[3]			
Brown Bear Hunting	Hunter Days	900	[4]
Black Bear Hunting	Hunter Days	2,600	[4]
Deer Hunting	Hunter Days	45,296	[4]
Sport Fishing Use	M WFUD's	175	181
Wildlife Habitat Capability (Percent of 1954 Capability)			
Deer	Percent	90	83
Brown Bear	Percent	98	96
Black Bear	Percent	97	92
Mountain Goat	Percent	99	99
Marten	Percent	92	86
Red Squirrel	Percent	97	95
Brown Creeper	Percent	59	54
Red-breasted Sapsucker	Percent	94	86
Hairy Woodpecker	Percent	83	74
Bald Eagle (Nesting)	Percent	92	92
Wolf	Percent	90	88
River Otter	Percent	93	93
Vancouver Canada Goose	Percent	94	87

Table 2-4A (continued)

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Allowable Sale Quantity[3]	MMBF	298	286
	MMCF	72	72
Precommercial Thinning[3]	Acres	5,750	5,550
Productive Old Growth Retained at End of Decade (Percent of 1954 Acres)			
Strata A	Percent	99	91
Strata B	Percent	97	86
Strata C	Percent	58	50
Strata D	Percent	56	54
Total	**Percent**	**91**	**82**
Road Construction[3]	Miles[3]	139	40
Suitable Lands Scheduled for Timber Harvest (all decades)	M Acres	1,173	1,173
Timber Harvest by Method[3]			
Clearcut	Acres	13,100	14,100
Tree Selection	Acres	400	400
Fisheries Improvement Projects[3]			
Projects	Number	25	[4]
Pounds of Fish (annual average)	MM pounds	4.7	[4]
Pounds of Fish (at full production)	MM pounds	19.9	[4]
Wildlife Improvement Projects[3]			
Non-structural	Acres	13,800	[4]
Structural	Number of Structures	385	[4]
Total Forest Budget[3]	MM Dollars	98.5	[4]
Payments to State[3]	MM Dollars	14.1	[4]
Employment[3]			
Commercial Fish	Jobs	4,925	[4]
Timber Harvest	Jobs	3,075	[4]
Recreation/Tourism	Jobs	2,925	[4]
Mining and Mineral Development	Jobs	1,100	[4]
Total[5]	**Jobs**	**15,225**	[4]
Income[3]			
Commercial Fish	MM $	161.6	[4]
Timber Harvest	MM $	119.9	[4]
Recreation/Tourism	MM $	78.9	[4]
Mining and Mineral Development	MM $	56.7	[4]
Total[5]	**MM $**	**516.6**	[4]

[1] Figures are in average annual amounts where noted.

[2] The abbreviations mean: M = thousands; MM = millions; RVD = recreation visitor day; PAOT = persons at one time; WFUD = wildlife and fish user day; MMBF = million board feet; MMCF = million cubic feet.

[3] Average annual.

[4] Not projected beyond the first decade.

[5] The totals include other sectors.

Land Use Designations

Table 2-5A

Land Use Designation Allocations - Alternative A

Land Use Designation	Acres	Suitable Timber Harvest Acres
Wilderness	2,672,603[1]	
Wilderness National Monument	3,099,048[1]	
Nonwilderness National Monument	159,372	
Research Natural Area	53,356[1]	
Special Interest Area	121,666[1]	
Other Area	33,035	
Primitive Recreation	3,975,046	
Enacted Municipal Watershed	9,773	
Old-Growth Habitat	712,159	
Semi-primitive Recreation	1,555,084	
Land Use Designation II	727,765[1]	
Wild, Scenic and Recreation River	337,777[1,2]	14,501
Experimental Forest	11,872	
Scenic Viewshed	916,472	397,428
Modified Landscape	1,180,098	423,839
Timber Production	821,069	346,929
Minerals	0	
Beach Fringe and Estuary	288,354	
Stream and Lake Protection	322,709[1]	77,968
Fish Habitat and Water Quality Requirements	0	

[1] Sometimes more than one land use designation may be applied to the same area, where the emphasis of more than one LUD is desired (such as a Research Natural Area within a Wilderness). In these cases, the more restrictive management prescription for the LUD's always takes precedence. To avoid double-counting, these overlapping acres are shown only for the most restrictive designation. The legends for each alternative map display the actual acreage overlaps.

[2] Acreages for the Wild, Scenic and Recreational River LUD's are not shown separately. The miles of river segments for each LUD are displayed in the Objectives table. Only Scenic or Recreation Rivers would have scheduled timber harvest.

[3] Minerals LUD acres represent an overlap with the underlying LUD (see alternative maps), and are not included in total LUD acres calculations.

Note: No acres are associated with the Transportation and Utility Systems LUD.

Alternative B

Theme

The theme of this alternative is to emphasize resource uses that contribute to the local and regional economies of Southeast Alaska, such as timber harvesting, commercial fishing, mining, recreation, and tourism. Non-market values such as wildlife habitat, visual quality, roadless area opportunities, and wild, scenic, and recreation rivers will be emphasized in selected areas. Opportunities for local residents to pursue traditional lifestyles, including subsistence use and recreation, will also be emphasized.

Goals

Rural Development

Emphasize opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.

Visual Resource

Provide Forest visitors with visually appealing scenery Forest-wide, with emphasis on areas seen along the Alaska Marine Highway, State highways, and major Forest roads. In areas where landscapes will be altered by management activities, manage for modified landscapes.

Recreation

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Fish Habitat

Maintain or improve the aquatic biological productivity of all anadromous and important resident fish streams and lakes (Class I). In less important resident fish streams (Class II), maintain habitat capability to the extent practical.

Wildlife Habitat

Maintain as much contiguous old-growth habitat as possible for old-growth associated species to ensure the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Subsistence

Provide for the continuation of subsistence uses by all rural Alaska residents.

Timber Management

Manage the timber resource to provide for the production of sawtimber and other wood products within the capability of the land, while meeting the management requirements for other resources. Manage timber on an evenflow, long-term sustained yield basis in an economically efficient manner. Seek to provide a timber supply consistent with local and regional needs.

Transportation

Develop and manage roads and utility system opportunities to support resource management objectives. Recognize opportunities for the development of utility systems.

Minerals

Emphasize the development of mineral resources in areas with high development potential. Require environmentally sound mineral exploration, development and reclamation in areas open to mineral entry while recognizing other resource needs and values. Provide for the environmentally sound exercise of valid existing rights in areas otherwise closed to mineral entry. Seek withdrawal of areas where mineral development is not allowed by a specific land use designation.

Wilderness and Roadless Areas

Maintain a wilderness setting consistent with ANILCA on the 5.8 million acres of Wilderness on the Tongass. Manage many inventoried roadless areas to retain their undeveloped character.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Research

Continue to seek out and promote research opportunities that are consistent with identified information needs.

Air

Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emission sources.

Soils

Maintain soil productivity, and minimize soil erosion resulting from land-disturbing activities.

Water

Provide water of sufficient quality to meet or exceed Alaska State Water Quality Standards for designated beneficial uses.

Riparian

Maintain or improve riparian-dependent resources consistent with existing laws and regulations.

Wetlands

Maintain wetlands and their associated functions and values to the extent practicable.

Objectives

Table 2-4B

Resource outputs, activities, effects and costs - Alternative B[1]

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Recreation Capacity (Recreation Opportunity Spectrum Classes)[3]			
Primitive, and Semi-primitive Non-motorized	M RVD's	1,352	[4]
Semi-primitive Motorized	M RVD's	1,291	[4]
Roaded Natural and Roaded Modified	M RVD's	1,456	[4]
Total	**M RVD's**	**4,099**	[4]
Trail Construction/Reconstruction[3]	Miles	7	[4]
Developed Site Construction/Reconstruction[3]	PAOT's	137	[4]
Visual Quality Objectives			
Retention	M Acres	5,440	5,440
Partial Retention	M Acres	3,377	3,377
Modification	M Acres	599	599
Maximum Modification	M Acres	1,861	1,861
Roadless Lands Remaining	M Acres	14,943	13,935
Wild and Scenic River Recommendations			
Wild	Miles	625	[4]
Scenic	Miles	148	[4]
Recreational	Miles	145	[4]
Research Natural Areas	Number	23	[4]
Special Interest Areas	Number	20	[4]
Experimental Forests	Number	1	[4]
Hunting and Fishing[3]			
Brown Bear Hunting	Hunter Days	900	[4]
Black Bear Hunting	Hunter Days	2,600	[4]
Deer Hunting	Hunter Days	45,296	[4]
Sport Fishing Use	M WFUD's	175	181
Wildlife Habitat Capability (Percent of 1954 Capability)			
Deer	Percent	90	81
Brown Bear	Percent	97	96
Black Bear	Percent	97	91
Mountain Goat	Percent	99	99
Marten	Percent	92	85
Red Squirrel	Percent	97	94
Brown Creeper	Percent	59	52
Red-breasted Sapsucker	Percent	93	84
Hairy Woodpecker	Percent	82	72
Bald Eagle (Nesting)	Percent	92	92
Wolf	Percent	90	84
River Otter	Percent	93	93
Vancouver Canada Goose	Percent	93	85

Table 2-4B (continued)

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Allowable Sale Quantity[3]	MMBF	343	328
	MMCF	82	82
Precommercial Thinning[3]	Acres	6,550	7,050
Productive Old Growth Retained at End of Decade (Percent of 1954 Acres)			
Strata A	Percent	99	90
Strata B	Percent	97	84
Strata C	Percent	57	48
Strata D	Percent	57	53
Total	**Percent**	**91**	**81**
Road Construction[3]	Miles[3]	161	47
Suitable Lands Scheduled for Timber Harvest (all decades)	M Acres	1,360	1,360
Timber Harvest by Method[3]			
Clearcut	Acres	16,900	18,200
Tree Selection	Acres	1,900	1,900
Fisheries Improvement Projects[3]			
Projects	Number	25	[4]
Pounds of Fish (annual average)	MM pounds	4.7	[4]
Pounds of Fish (at full production)	MM pounds	19.9	[4]
Wildlife Improvement Projects[3]			
Non-structural	Acres	13,800	[4]
Structural	Number of Structures	385	[4]
Total Forest Budget[3]	MM Dollars	101.6	[4]
Payments to State[3]	MM Dollars	15.3	[4]
Employment[3]			
Commercial Fish	Jobs	4,925	[4]
Timber Harvest	Jobs	3,575	[4]
Recreation/Tourism	Jobs	2,925	[4]
Mining and Mineral Development	Jobs	1,100	[4]
Total[5]	**Jobs**	**15,725**	[4]
Income[3]			
Commercial Fish	MM $	161.6	[4]
Timber Harvest	MM $	138.3	[4]
Recreation/Tourism	MM $	78.9	[4]
Mining and Mineral Development	MM $	56.7	[4]
Total[5]	**MM $**	**535.0**	[4]

[1] Figures are in average annual amounts where noted.

[2] The abbreviations mean: M = thousands; MM = millions; RVD = recreation visitor day; PAOT = persons at one time; WFUD = wildlife and fish user day; MMBF = million board feet; MMCF = million cubic feet.

[3] Average annual.

[4] Not projected beyond the first decade.

[5] The totals include other sectors.

Land Use Designations

Table 2-5B

Land Use Designation Allocations - Alternative B

Land Use Designation	Acres	Suitable Timber Harvest Acres
Wilderness	2,672,603[1]	
Wilderness National Monument	3,099,048[1]	
Nonwilderness National Monument	159,372	
Research Natural Area	52,895[1]	
Special Interest Area	141,757[1]	
Other Area	35,636[1]	
Primitive Recreation	4,029,974	
Enacted Municipal Watershed	9,773	
Old-Growth Habitat	17,372	
Semi-primitive Recreation	1,648,636	
Land Use Designation II	727,765[1]	
Wild, Scenic and Recreation River	202,531[1,2]	9,939
Experimental Forest	10,812	
Scenic Viewshed	1,014,631	424,441
Modified Landscape	701,361	202,436
Timber Production	1,842,686	724,717
Minerals	130,200[3]	
Beach Fringe and Estuary	232,327	
Stream and Lake Protection	398,079[1]	95,100
Fish Habitat and Water Quality Requirements	0	

[1] Sometimes more than one land use designation may be applied to the same area, where the emphasis of more than one LUD is desired (such as a Research Natural Area within a Wilderness). In these cases, the more restrictive management prescription for the LUD's always takes precedence. To avoid double-counting, these overlapping acres are shown only for the most restrictive designation. The legends for each alternative map display the actual acreage overlaps.

[2] Acreages for the Wild, Scenic and Recreational River LUD's are not shown separately. The miles of river segments for each LUD are displayed in the Objectives table. Only Scenic or Recreation Rivers would have scheduled timber harvest.

[3] Minerals LUD acres represent an overlap with the underlying LUD (see alternative maps), and are not included in total LUD acres calculations.

Note: No acres are associated with the Transportation and Utility Systems LUD.

Alternative C

Theme

The theme of this alternative is to continue the land use designations, resource outputs and activities, and management direction of the current Tongass Land Management Plan (as approved in 1979, amended in 1986, and amended by the Tongass Timber Reform Act of 1990). Timber harvest levels that contribute to maintaining local employment are emphasized, along with maintaining the variety of recreation opportunities and scenic quality currently available. Opportunities for local residents to pursue traditional lifestyles, including subsistence use and recreation, will continue.

Goals

Rural Development

Emphasize opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.

Visual Resource

Maintain the scenic qualities of the most highly viewed landscapes on the Forest by managing many of these areas in ways which would not modify them significantly. In those areas where management activity will take place, and in keeping with the land use designation, projects will be designed to be compatible with the natural elements of the visual resource.

Recreation

Provide a broad spectrum of recreation opportunities with emphasis on maintaining natural areas with the highest wildlife, sport fish and dispersed recreation assets. Manage recreation facilities and attractions near communities to protect their natural features while developing access and needed facilities.

Fish Habitat

Maintain or improve the aquatic biological productivity of all anadromous and important resident fish streams and lakes (Class I). In less important resident fish streams (Class II), maintain habitat capability to the extent practical.

Wildlife Habitat

Maintain and enhance the natural productivity of the Forest's wildlife habitat by managing many of the highest quality areas in ways which would not significantly modify them. In areas where major modifications will occur, design those changes to minimize adverse effects to wildlife.

Subsistence

Provide for the continuation of subsistence uses by all rural Alaska residents.

Timber Management

Make enough timber available from National Forest lands to maintain current levels of timber-related employment within the context of the total timber available from other ownerships. Manage timber on an evenflow, long-term sustained yield basis in an economically efficient manner. Seek to provide a timber supply consistent with local and regional needs.

Transportation

Insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study be managed to allow their development with due consideration of the various resources. Develop and manage roads to support economic timber harvest and to maintain or enhance the area's economic potential.

Minerals

Facilitate the orderly development of mineral resources in accordance with current regulations and applicable laws.

Wilderness and Roadless Areas

Maintain a wilderness setting consistent with ANILCA on the 5.8 million acres of Wilderness on the Tongass. Manage selected inventoried roadless areas to retain their undeveloped character.

Wild and Scenic Rivers

No rivers are recommended for designation as components of the National Wild and Scenic Rivers System under this alternative.

Research

Continue to seek out and promote research opportunities that are consistent with identified information needs.

Air

Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emission sources.

Soils

Maintain soil productivity, and minimize soil erosion resulting from land-disturbing activities.

Water

Provide water of sufficient quality to meet or exceed Alaska State Water Quality Standards for designated beneficial uses.

Riparian

Maintain or improve riparian-dependent resources consistent with existing laws and regulations.

Wetlands

Maintain wetlands and their associated functions and values to the extent practicable.

Objectives

Table 2-4C

Resource outputs, activities, effects and costs - Alternative C[1]

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Recreation Capacity (Recreation Opportunity Spectrum Classes)[3]			
Primitive, and Semi-primitive Non-motorized	M RVD's	964	[4]
Semi-primitive Motorized	M RVD's	978	[4]
Roaded Natural and Roaded Modified	M RVD's	2,779	[4]
Total	**M RVD's**	**4,721**	[4]
Trail Construction/Reconstruction[3]	Miles	7	[4]
Developed Site Construction/Reconstruction[3]	PAOT's	137	[4]
Visual Quality Objectives			
Retention	M Acres	5,025	5,025
Partial Retention	M Acres	2,210	2,210
Modification	M Acres	1,009	1,009
Maximum Modification	M Acres	3,073	3,073
Roadless Lands Remaining	M Acres	14,738	13,302
Wild and Scenic River Recommendations			
Wild	Miles	0	[4]
Scenic	Miles	0	[4]
Recreational	Miles	0	[4]
Research Natural Areas	Number	20	[4]
Special Interest Areas	Number	7	[4]
Experimental Forests	Number	2	[4]
Hunting and Fishing[3]			
Brown Bear Hunting	Hunter Days	900	[4]
Black Bear Hunting	Hunter Days	2,600	[4]
Deer Hunting	Hunter Days	45,296	[4]
Sport Fishing Use	M WFUD's	175	181
Wildlife Habitat Capability (Percent of 1954 Capability)			
Deer	Percent	88	75
Brown Bear	Percent	96	93
Black Bear	Percent	96	89
Mountain Goat	Percent	99	99
Marten	Percent	90	80
Red Squirrel	Percent	95	91
Brown Creeper	Percent	57	47
Red-breasted Sapsucker	Percent	90	78
Hairy Woodpecker	Percent	80	66
Bald Eagle (Nesting)	Percent	92	92
Wolf	Percent	88	80
River Otter	Percent	93	93
Vancouver Canada Goose	Percent	91	81

Table 2-4C (continued)

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Allowable Sale Quantity[3]	MMBF	451	428
	MMCF	108	108
Precommercial Thinning[3]	Acres	8,450	9,100
Productive Old Growth Retained at End of Decade (Percent of 1954 Acres)			
Strata A	Percent	99	87
Strata B	Percent	95	79
Strata C	Percent	57	45
Strata D	Percent	54	48
Total	**Percent**	**90**	**77**
Road Construction[3]	Miles[3]	225	64
Suitable Lands Scheduled for Timber Harvest (all decades)	M Acres	1,732	1,732
Timber Harvest by Method[3]			
Clearcut	Acres	17,200	19,600
Tree Selection	Acres	700	700
Fisheries Improvement Projects[3]			
Projects	Number	25	[4]
Pounds of Fish (annual average)	MM pounds	4.7	[4]
Pounds of Fish (at full production)	MM pounds	19.9	[4]
Wildlife Improvement Projects[3]			
Non-structural	Acres	13,800	[4]
Structural	Number of Structures	385	[4]
Total Forest Budget[3]	MM Dollars	97.7	[4]
Payments to State[3]	MM Dollars	20.6	[4]
Employment[3]			
Commercial Fish	Jobs	4,925	[4]
Timber Harvest	Jobs	4,700	[4]
Recreation/Tourism	Jobs	2,525	[4]
Mining and Mineral Development	Jobs	1,100	[4]
Total[5]	**Jobs**	**16,450**	[4]
Income[3]			
Commercial Fish	MM $	161.6	[4]
Timber Harvest	MM $	181.8	[4]
Recreation/Tourism	MM $	68.1	[4]
Mining and Mineral Development	MM $	56.7	[4]
Total[5]	**MM $**	**567.7**	[4]

[1] Figures are in average annual amounts where noted.

[2] The abbreviations mean: M = thousands; MM = millions; RVD = recreation visitor day; PAOT = persons at one time; WFUD = wildlife and fish user day; MMBF = million board feet; MMCF = million cubic feet.

[3] Average annual.

[4] Not projected beyond the first decade.

[5] The totals include other sectors.

Land Use Designations

Table 2-5C

Land Use Designation Allocations - Alternative C

Land Use Designation	Acres	Suitable Timber Harvest Acres
Wilderness	2,672,603(1)	
Wilderness National Monument	3,099,048[1]	
Nonwilderness National Monument	159,372	
Research Natural Area	37,697[1]	
Special Interest Area	7,893[1]	
Other Area	0	
Primitive Recreation	3,132,379	
Enacted Municipal Watershed	9,773	
Old-Growth Habitat	367,421	
Semi-primitive Recreation	557,171	
Land Use Designation II	727,765[1]	
Wild, Scenic and Recreation River	0	
Experimental Forest	17,259	
Scenic Viewshed	680,081	252,046
Modified Landscape	1,324,295	379,442
Timber Production	3,148,599	1,176,791
Minerals	0	
Beach Fringe and Estuary	449,558	
Stream and Lake Protection	606,344	130,699
Fish Habitat and Water Quality Requirements	0	

[1] Sometimes more than one land use designation may be applied to the same area, where the emphasis of more than one LUD is desired (such as a Research Natural Area within a Wilderness). In these cases, the more restrictive management prescription for the LUD's always takes precedence. To avoid double-counting, these overlapping acres are shown only for the most restrictive designation. The legends for each alternative map display the actual acreage overlaps.

[2] Acreages for the Wild, Scenic and Recreational River LUD's are not shown separately. The miles of river segments for each LUD are displayed in the Objectives table.

[3] Minerals LUD acres represent an overlap with the underlying LUD (see alternative maps), and are not included in total LUD acres calculations.

Note: No acres are associated with the Transportation and Utility Systems LUD.

Alternative D

Theme

The theme of this alternative is to provide an economic timber supply from public lands to meet predicted demand and the existing mill capacity in Southeast Alaska. Management of other resources will be done in an efficient manner consistent with the emphasis on timber supply, and while meeting environmental standards. Some areas with low timber volumes will be managed for recreation, visual quality and other non-commodity values. Areas in and around communities will be managed to provide for recreation and related traditional uses, including subsistence.

Goals

Rural Development

Emphasize opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.

Visual Resource

Maintain visually appealing scenery adjacent to communities. In areas where landscapes will be altered by management activities, allow extensively modified landscapes.

Recreation

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places within community home ranges.

Fish Habitat

Maintain the aquatic biological productivity of all anadromous and important resident fish streams and lakes (Class I). In less important resident fish streams (Class II), maintain habitat capability to the extent practical.

Wildlife Habitat

Maintain enough old-growth habitat for old-growth associated species to ensure the maintenance of viable populations.

Subsistence

Provide for the continuation of subsistence uses by all rural Alaska residents.

Timber Management

Manage the timber resource to provide for the maximum production of sawtimber and other wood products within the capability of the land, while meeting minimum requirements for other resources. Manage timber on an evenflow, long-term sustained yield basis in an economically efficient manner. Seek to provide a timber supply to meet local and regional needs.

Transportation

Develop and manage roads and utility system opportunities to support resource management objectives. Recognize opportunities for the development of utility systems.

Minerals

Emphasize the development of mineral resources in areas with high development potential. Require environmentally sound mineral exploration, development and reclamation in areas open to mineral entry while recognizing other resource needs and values. Provide for the environmentally sound exercise of valid existing rights in areas otherwise closed to mineral entry. Seek withdrawal of areas where mineral development is not allowed by a specific land use designation.

Wilderness and Roadless Areas

Maintain a wilderness setting consistent with ANILCA on the 5.8 million acres of Wilderness on the Tongass. Manage some inventoried roadless areas to retain their undeveloped character where consistent with the timber production goal.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Research

Continue to seek out and promote research opportunities that are consistent with identified information needs.

Air

Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emission sources.

Soils

Maintain soil productivity, and minimize soil erosion resulting from land-disturbing activities.

Water

Provide water of sufficient quality to meet or exceed Alaska State Water Quality Standards for designated beneficial uses.

Riparian

Maintain or improve riparian-dependent resources consistent with existing laws and regulations.

Wetlands

Maintain wetlands and their associated functions and values to the extent practicable.

Objectives

Table 2-4D

Resource outputs, activities, effects and costs - Alternative D[1]

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Recreation Capacity (Recreation Opportunity Spectrum Classes)[3]			
Primitive, and Semi-primitive Non-motorized	M RVD's	1,130	[4]
Semi-primitive Motorized	M RVD's	1,072	[4]
Roaded Natural and Roaded Modified	M RVD's	2,240	[4]
Total	**M RVD's**	**4,442**	[4]
Trail Construction/Reconstruction[3]	Miles	7	[4]
Developed Site Construction/Reconstruction[3]	PAOT's	137	[4]
Visual Quality Objectives			
Retention	M Acres	2,891	2,891
Partial Retention	M Acres	3,720	3,720
Modification	M Acres	661	661
Maximum Modification	M Acres	4,025	4,025
Roadless Lands Remaining	M Acres	14,729	13,298
Wild and Scenic River Recommendations			
Wild	Miles	360	[4]
Scenic	Miles	23	[4]
Recreational	Miles	87	[4]
Research Natural Areas	Number	20	[4]
Special Interest Areas	Number	9	[4]
Experimental Forests	Number	1	[4]
Hunting and Fishing[3]			
Brown Bear Hunting	Hunter Days	900	[4]
Black Bear Hunting	Hunter Days	2,600	[4]
Deer Hunting	Hunter Days	45,296	[4]
Sport Fishing Use	M WFUD's	175	181
Wildlife Habitat Capability (Percent of 1954 Capability)			
Deer	Percent	87	74
Brown Bear	Percent	96	93
Black Bear	Percent	97	89
Mountain Goat	Percent	99	99
Marten	Percent	90	79
Red Squirrel	Percent	95	91
Brown Creeper	Percent	59	48
Red-breasted Sapsucker	Percent	91	78
Hairy Woodpecker	Percent	79	65
Bald Eagle (Nesting)	Percent	84	72
Wolf	Percent	88	79
River Otter	Percent	83	79
Vancouver Canada Goose	Percent	91	80

Table 2-4D (continued)

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Allowable Sale Quantity[3]	MMBF	472	440
	MMCF	112	112
Precommercial Thinning[3]	Acres	8,600	9,800
Productive Old Growth Retained at End of Decade (Percent of 1954 Acres)			
Strata A	Percent	99	87
Strata B	Percent	95	78
Strata C	Percent	56	43
Strata D	Percent	55	48
Total	**Percent**	**90**	**76**
Road Construction[3]	Miles[3]	228	58
Suitable Lands Scheduled for Timber Harvest (all decades)	M Acres	1,818	1,818
Timber Harvest by Method[3]			
Clearcut	Acres	17,200	19,600
Tree Selection	Acres	1,600	1,600
Fisheries Improvement Projects[3]			
Projects	Number	25	[4]
Pounds of Fish (annual average)	MM pounds	4.7	[4]
Pounds of Fish (at full production)	MM pounds	19.9	[4]
Wildlife Improvement Projects[3]			
Non-structural	Acres	13,800	[4]
Structural	Number of Structures	385	[4]
Total Forest Budget[3]	MM Dollars	148.5	[4]
Payments to State[3]	MM Dollars	21.3	[4]
Employment[3]			
Commercial Fish	Jobs	4,925	[4]
Timber Harvest	Jobs	4,925	[4]
Recreation/Tourism	Jobs	2,650	[4]
Mining and Mineral Development	Jobs	1,100	[4]
Total[5]	**Jobs**	**16,800**	[4]
Income[3]			
Commercial Fish	MM $	161.6	[4]
Timber Harvest	MM $	190.6	[4]
Recreation/Tourism	MM $	71.5	[4]
Mining and Mineral Development	MM $	56.7	[4]
Total[5]	**MM $**	**579.9**	[4]

[1] Figures are in average annual amounts where noted.

[2] The abbreviations mean: M = thousands; MM = millions; RVD = recreation visitor day; PAOT = persons at one time; WFUD = wildlife and fish user day; MMBF = million board feet; MMCF = million cubic feet.

[3] Average annual.

[4] Not projected beyond the first decade.

[5] The totals include other sectors.

Land Use Designations

Table 2-5D

Land Use Designation Allocations - Alternative D

Land Use Designation	Acres	Suitable Timber Harvest Acres
Wilderness	2,672,603[1]	
Wilderness National Monument	3,099,048[1]	
Nonwilderness National Monument	159,372	
Research Natural Area	27,646[1]	
Special Interest Area	19,885[1]	
Other Area	43,455[1]	
Primitive Recreation	1,963,480	
Enacted Municipal Watershed	9,773	
Old-Growth Habitat	17,236	
Semi-primitive Recreation	2,672,875	
Land Use Designation II	727,765[1]	
Wild, Scenic and Recreation River	52,225[1,2]	2,559
Experimental Forest	10,812	
Scenic Viewshed	238,718	65,109
Modified Landscape	561,439	186,759
Timber Production	4,148,845	1,605,679
Minerals	338,300[3]	
Beach Fringe and Estuary	0	
Stream and Lake Protection	0	
Fish Habitat and Water Quality Requirements	572,081[1]	129,320

[1] Sometimes more than one land use designation may be applied to the same area, where the emphasis of more than one LUD is desired (such as a Research Natural Area within a Wilderness). In these cases, the more restrictive management prescription for the LUD's always takes precedence. To avoid double-counting, these overlapping acres are shown only for the most restrictive designation. The legends for each alternative map display the actual acreage overlaps.

[2] Acreages for the Wild, Scenic and Recreational River LUD's are not shown separately. The miles of river segments for each LUD are displayed in the Objectives table. Only Scenic or Recreation Rivers would have scheduled timber harvest.

[3] Minerals LUD acres represent an overlap with the underlying LUD (see alternative maps), and are not included in total LUD acres calculations.

Note: No acres are associated with the Transportation and Utility Systems LUD.

Alternative P

Theme

The theme of this alternative is to enhance the balanced use of resources of the forest and provide a public timber supply to maintain the Southeast Alaska timber industry. Many of the most important wildlife habitats, recreation and subsistence opportunities and scenic values will be maintained in a natural setting. Minerals development is encouraged in selected areas. Resources that will contribute to the local and regional economies of Southeast Alaska are emphasized. Alternative P is the Forest Service's preferred alternative.

Goals

Rural Development

Emphasize opportunities for resource uses that contribute to the local and regional economies of Southeast Alaska.

Visual Resource

Provide Forest visitors with visually appealing scenery, with emphasis on most areas seen along the Alaska Marine Highway, State highways, and major Forest roads. In other areas, where landscapes are being altered by management activities, the activity may dominate the characteristic landscape.

Recreation

Provide a range of recreation opportunities consistent with public demand, with emphasis on recreation places identified as being popular with local users or important to the tourism industry.

Fish Habitat

Maintain or improve the aquatic biological productivity of all anadromous and important resident fish streams and lakes (Class I). In less important resident fish streams (Class II), maintain habitat capability to the extent practical.

Wildlife Habitat

Maintain as much contiguous old-growth habitat as possible for old-growth associated species to ensure the maintenance of viable populations. Minimize adverse impacts from human activities through road and facility management.

Subsistence

Provide for the continuation of subsistence uses by all rural Alaska residents.

Timber Management

Manage the timber resource to provide for the maximum production of sawtimber and other wood products within the capability of the land, while meeting the management requirements for other resources. Manage timber on an evenflow, long-term sustained yield basis in the most economically efficient manner. Seek to provide a timber supply consistent with local and regional needs.

Transportation

Develop and manage roads and utility system opportunities to support resource management objectives. Recognize opportunities for the development of utility systems.

Minerals

Emphasize the development of mineral resources in areas with high development potential. Require environmentally sound mineral exploration, development and reclamation in areas open to mineral entry while recognizing other resource needs and values. Provide for the environmentally sound exercise of valid existing rights in areas otherwise closed to mineral entry. Seek withdrawal of areas where mineral development is not allowed by a specific land use designation.

Wilderness and Roadless Areas

Maintain a wilderness setting consistent with ANILCA on the 5.8 million acres of Wilderness on the Tongass. Manage selected inventoried roadless areas to retain their undeveloped character.

Wild and Scenic Rivers

Maintain the outstandingly remarkable features of rivers recommended for designation as components of the National Wild and Scenic Rivers System.

Research

Continue to seek out and promote research opportunities that are consistent with identified information needs.

Air

Maintain the current air resource condition to protect the Forest's ecosystems from on- and off-Forest air emission sources.

Soils

Maintain soil productivity, and minimize soil erosion resulting from land-disturbing activities.

Water

Provide water of sufficient quality to meet or exceed Alaska State Water Quality Standards for designated beneficial uses.

Riparian

Maintain or improve riparian-dependent resources consistent with existing laws and regulations.

Wetlands

Maintain wetlands and their associated functions and values to the extent practicable.

Objectives

Table 2-4P

Resource outputs, activities, effects and costs - Alternative P[1]

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Recreation Capacity (Recreation Opportunity Spectrum Classes)[3]			
Primitive, and Semi-primitive Non-motorized	M RVD's	1,012	[4]
Semi-primitive Motorized	M RVD's	1,003	[4]
Roaded Natural and Roaded Modified	M RVD's	2,657	[4]
Total	**M RVD's**	**4,672**	[4]
Trail Construction/Reconstruction[3]	Miles	7	[4]
Developed Site Construction/Reconstruction[3]	PAOT's	137	[4]
Visual Quality Objectives			
Retention	M Acres	4,611	4,611
Partial Retention	M Acres	3,092	3,092
Modification	M Acres	1,141	1,141
Maximum Modification	M Acres	2,446	2,446
Roadless Lands Remaining	M Acres	14,802	13,503
Wild and Scenic River Recommendations			
Wild	Miles	260	[4]
Scenic	Miles	88	[4]
Recreational	Miles	85	[4]
Research Natural Areas	Number	23	[4]
Special Interest Areas	Number	20	[4]
Experimental Forests	Number	1	[4]
Hunting and Fishing[3]			
Brown Bear Hunting	Hunter Days	900	[4]
Black Bear Hunting	Hunter Days	2,600	[4]
Deer Hunting	Hunter Days	45,296	[4]
Sport Fishing Use	M WFUD's	175	181
Wildlife Habitat Capability (Percent of 1954 Capability)			
Deer	Percent	89	77
Brown Bear	Percent	96	94
Black Bear	Percent	97	89
Mountain Goat	Percent	99	99
Marten	Percent	90	81
Red Squirrel	Percent	95	91
Brown Creeper	Percent	59	48
Red-breasted Sapsucker	Percent	90	79
Hairy Woodpecker	Percent	80	67
Bald Eagle (Nesting)	Percent	92	92
Wolf	Percent	89	83
River Otter	Percent	93	93
Vancouver Canada Goose	Percent	91	82

Table 2-4P (continued)

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	First Decade	Fifth Decade
Allowable Sale Quantity[3]	MMBF	418	399
	MMCF	100	100
Precommercial Thinning[3]	Acres	7,800	8,300
Productive Old Growth Retained at End of Decade (Percent of 1954 Acres)			
Strata A	Percent	99	89
Strata B	Percent	95	79
Strata C	Percent	58	46
Strata D	Percent	54	49
Total	**Percent**	**91**	**78**
Road Construction[3]	Miles[3]	205	58
Suitable Lands Scheduled for Timber Harvest (all decades)	M Acres	1,649	1,649
Timber Harvest by Method[3]			
Clearcut	Acres	15,600	16,600
Tree Selection	Acres	300	300
Fisheries Improvement Projects[3]			
Projects	Number	25	[4]
Pounds of Fish (annual average)	MM pounds	4.7	[4]
Pounds of Fish (at full production)	MM pounds	19.9	[4]
Wildlife Improvement Projects[3]			
Non-structural	Acres	13,800	[4]
Structural	Number of Structures	385	[4]
Total Forest Budget[3]	MM Dollars	106.6	[4]
Payments to State[3]	MM Dollars	18.9	[4]
Employment[3]			
Commercial Fish	Jobs	4,925	[4]
Timber Harvest	Jobs	4,350	[4]
Recreation/Tourism	Jobs	2,550	[4]
Mining and Mineral Development	Jobs	1,100	[4]
Total[5]	**Jobs**	**16,125**	[4]
Income[3]			
Commercial Fish	MM $	161.6	[4]
Timber Harvest	MM $	169.3	[4]
Recreation/Tourism	MM $	68.8	[4]
Mining and Mineral Development	MM $	56.7	[4]
Total[5]	**MM $**	**555.9**	[4]

[1] Figures are in average annual amounts where noted.

[2] The abbreviations mean: M = thousands; MM = millions; RVD = recreation visitor day; PAOT = persons at one time; WFUD = wildlife and fish user day; MMBF = million board feet; MMCF = million cubic feet.

[3] Average annual.

[4] Not projected beyond the first decade.

[5] The totals include other sectors.

Land Use Designations

Table 2-5P

Land Use Designation Allocations - Alternative P

Land Use Designation	Acres	Suitable Timber Harvest Acres
Wilderness	2,672,603[1]	
Wilderness National Monument	3,099,048[1]	
Nonwilderness National Monument	159,372	
Research Natural Area	37,777[1]	
Special Interest Area	123,912[1]	
Other Area	133,806	
Primitive Recreation	2,847,634	
Enacted Municipal Watershed	9,773	
Old-Growth Habitat	246,765	
Semi-primitive Recreation	1,265,062	
Land Use Designation II	727,765[1]	
Wild, Scenic and Recreation River	103,309[1,2]	5,536
Experimental Forest	10,812	
Scenic Viewshed	909,294	350,047
Modified Landscape	1,299,542	446,244
Timber Production	2,480,327	918,955
Minerals	185,500[3]	
Beach Fringe and Estuary	320,278	
Stream and Lake Protection	550,179[1]	126,812
Fish Habitat and Water Quality Requirements	0	

[1] Sometimes more than one land use designation may be applied to the same area, where the emphasis of more than one LUD is desired (such as a Research Natural Area within a Wilderness). In these cases, the more restrictive management prescription for the LUD's always takes precedence. To avoid double-counting, these overlapping acres are shown only for the most restrictive designation. The legends for each alternative map display the actual acreage overlaps.

[2] Acreages for the Wild, Scenic and Recreational River LUD's are not shown separately. The miles of river segments for each LUD are displayed in the Objectives table. Only Scenic or Recreation Rivers would have scheduled timber harvest.

[3] Minerals LUD acres represent an overlap with the underlying LUD (see alternative maps), and are not included in total LUD acres calculations.

Note: No acres are associated with the Transportation and Utility Systems LUD.

Comparison of Alternatives

This section presents comparisons of the five alternatives considered in detail. The comparisons focus on the public issues, and are intended to highlight the major differences between the alternatives. Chapter 3 contains more detail on environmental consequences. The discussion here will include comparisons of land use designation (LUD) allocations, resource outputs, economic factors, and selected effects.

Overall Comparisons

Table 2-6 displays the allocations of the land use designations for all five alternatives. Table 2-7 shows the same allocations combined into the land use designation groups explained earlier, which are based on similarities in the potential to create environmental effects. These groups are also displayed in Figure 2-2. The following discussions will refer to these tables frequently. Table 2-8 displays the alternative objectives (outputs, activities and effects) in comparative form. Many of these are discussed later in this section. At the end of the chapter, Table 2-24 presents a summary of some of the other outputs and effects discussed.

Table 2-6

Land Use Designation Acres by Alternative[1]

Land Use Designation	A	B	C	D	P
Wilderness	2,672,603	2,672,603	2,672,603	2,672,603	2,672,603
Wilderness National Monument	3,099,048	3,099,048	3,099,048	3,099,048	3,099,048
Nonwilderness National Monument	159,372	159,372	159,372	159,372	159,372
Research Natural Area	53,356	52,895	37,697	27,646	37,777
Special Interest Area	121,666	141,757	7,893	19,885	123,912
Other Area	33,035	35,636	0	43,455	133,806
Primitive Recreation	3,975,046	4,029,974	3,132,379	1,963,480	2,847,634
Enacted Municipal Watershed	9,773	9,773	9,773	9,773	9,773
Old-Growth Habitat	712,159	17,372	367,421	17,236	246,765
Semi-primitive Recreation	1,555,084	1,648,636	557,171	2,672,875	1,265,062
Land Use Designation II	727,765	727,765	727,765	727,765	727,765
Wild, Scenic and Recreation River	337,777	202,531	0	52,225	103,309
	(14,501)	(9,937)		(2,559)	(5,536)
Experimental Forest	11,872	10,812	17,259	10,812	10,812
Scenic Viewshed	916,472	1,014,631	680,081	238,718	909,294
	(397,428)	(424,441)	(252,046)	(65,109)	(350,047)
Modified Landscape	1,180,098	701,361	1,324,295	561,439	1,299,542
	(423,839)	(202,436)	(379,442)	(186,759)	(446,244)
Timber Production	821,069	1,842,686	3,148,599	4,148,845	2,480,327
	(346,929)	(724,717)	(1,176,791)	(1,605,679)	(918,955)
Minerals	0	130,200	0	338,300	185,500
Beach Fringe and Estuary	288,354	232,327	449,558	0	320,278
Stream and Lake Protection	322,709	398,079	606,344	0	550,179
	(77,968)	(95,100)	(130,699)		(126,812)
Fish Habitat and Water Quality Requirements	0	0	0	572,081	0
				(129,320)	

[1] Suitable acres within each land use designation available for timber harvest are shown in parentheses beneath the total LUD acres.

Table 2-7

Land Use Designation Group Acres by Alternative

Land Use Designation Group	A	B	C	D	P
Wilderness	5,931,024	5,931,024	5,931,024	5,931,024	5,931,024
Natural Setting	7,814,693	7,099,945	5,290,896	5,535,457	5,832,567
Moderate Development	2,430,471	2,123,603	2,627,300	1,381,932	2,753,901
Intensive Development	821,069	1,842,686	3,148,037	4,148,845	2,479,766

Figure 2-2

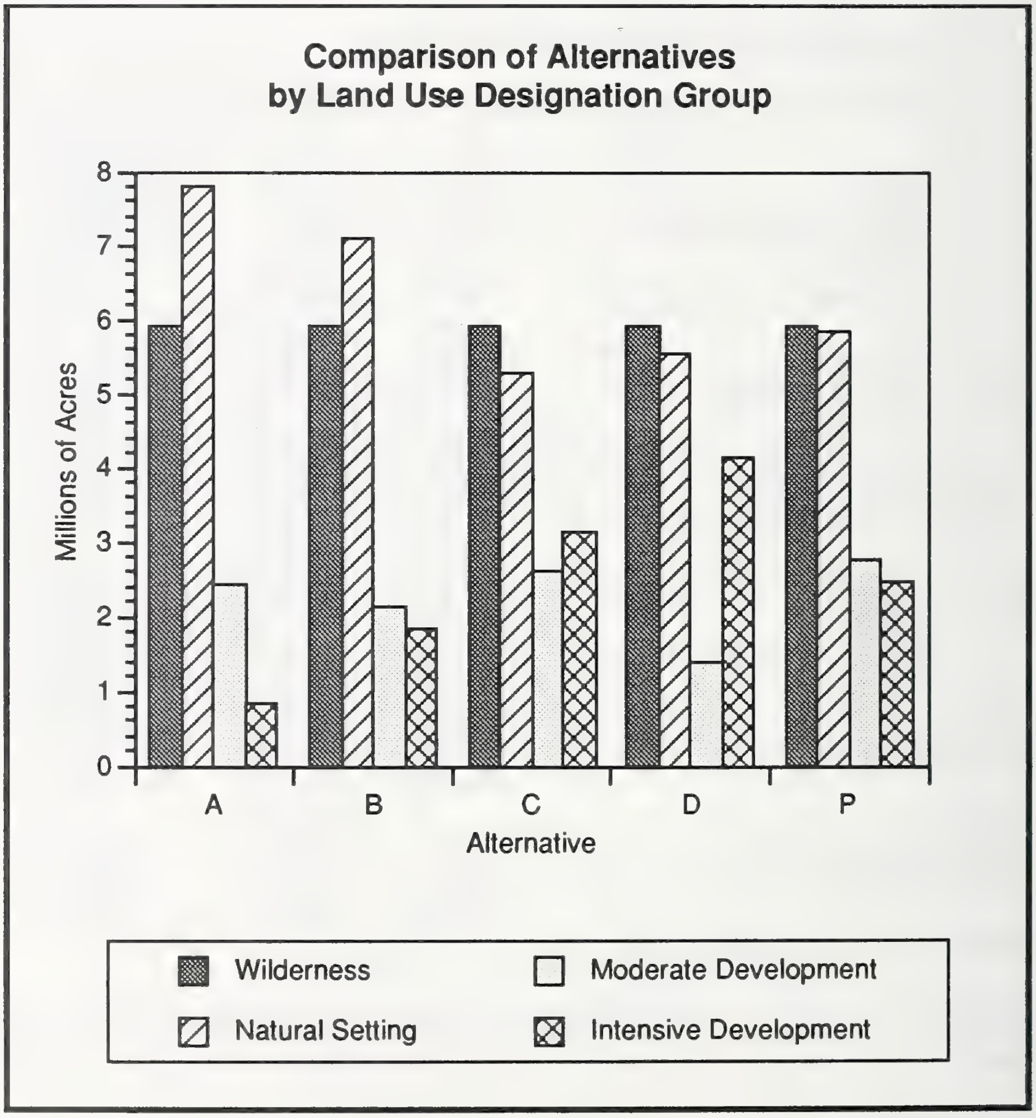


Table 2-8

Alternative Comparisons: Resource objectives for the first decade[1]

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	Alternative A	B	C	D	P
Recreation Capacity (Recreation Opportunity Spectrum Classes) [3]						
Primitive, and Semi-primitive Non-motorized	M RVD's	1,394	1,352	964	1,130	1,012
Semi-primitive Motorized	M RVD's	1,296	1,291	978	1,072	1,003
Roaded Natural and Roaded Modified	M RVD's	1,341	1,456	2,779	2,240	2,657
Total	**M RVD's**	**4,031**	**4,099**	**4,721**	**4,442**	**4,672**
Trail Construction/Reconstruction [3]	Miles	7	7	7	7	7
Developed Site Construction/ Reconstruction [3]	PAOT's	137	137	137	137	137
Visual Quality Objectives						
Retention	M Acres	6,097	5,440	5,025	2,891	4,611
Partial Retention	M Acres	3,497	3,377	2,210	3,720	3,092
Modification	M Acres	818	599	1,009	661	1,141
Maximum Modification	M Acres	850	1,861	3,073	4,025	2,446
Roadless Lands Remaining	M Acres	15,014	14,943	14,738	14,729	14,802
Wild and Scenic River Recommendations						
Wild	Miles	1,074	625	0	360	260
Scenic	Miles	155	148	0	23	88
Recreational	Miles	154	145	0	87	85
Research Natural Areas	Number	24	23	20	20	23
Special Interest Areas	Number	20	20	7	9	20
Experimental Forests	Number	1	1	2	1	1
Hunting and Fishing						
Brown Bear Hunting	Hr. Days	900	900	900	900	900
Black Bear Hunting	Hr. Days	2,600	2,600	2,600	2,600	2,600
Deer Hunting	Hr. Days	45,296	45,296	45,296	45,296	45,296
Sport Fishing Use	M WFUD's	175	175	175	175	175
Wildlife Habitat Capability (Percent of 1954 Capability)						
Deer	Percent	90	90	88	87	89
Brown Bear	Percent	98	97	96	96	96
Black Bear	Percent	97	97	96	97	97
Mountain Goat	Percent	99	99	99	99	99
Marten	Percent	92	92	90	90	90
Red Squirrel	Percent	97	97	95	95	95
Brown Creeper	Percent	59	59	57	59	59
Red-breasted Sapsucker	Percent	94	93	90	91	90
Hairy Woodpecker	Percent	83	82	80	79	80
Bald Eagle (Nesting)	Percent	92	92	92	84	92
Wolf	Percent	90	90	88	88	89
River Otter	Percent	93	93	93	83	93
Vancouver Canada Goose	Percent	94	93	91	91	91
Allowable Sale Quantity [3]	MMBF	298	343	451	472	418
	MMCF	72	82	108	112	100

Table 2-8 (continued)

Resource Output, Activity, Effect or Cost	Unit of Measure[2]	Alternative A	B	C	D	P
Precommercial Thinning [3]	Acres	5,750	6,550	8,450	8,600	7,800
Productive Old Growth Retained at End of Decade: (Percent of 1954 Acres)						
Strata A	Percent	99	99	99	99	99
Strata B	Percent	97	97	95	95	95
Strata C	Percent	58	57	57	56	58
Strata D	Percent	56	57	54	55	54
Total	Percent	91	91	90	90	91
Road Construction [3]	Miles	139	161	225	228	205
Suitable Lands Scheduled for Timber Harvest (all decades)	M Acres	1,173	1,360	1,732	1,818	1,649
Timber Harvest by Method [3]						
Clearcut	Acres	13,100	16,900	17,200	17,200	15,600
Tree Selection	Acres	400	1,900	700	1,600	300
Fisheries Improvement Projects [3]						
Projects	Number	25	25	25	25	25
Pounds of Fish (average annual)	MM lbs.	4.7	4.7	4.7	4.7	4.7
Pounds of Fish (at full production)	MM lbs.	19.9	19.9	19.9	19.9	19.9
Wildlife Improvement Projects						
Non-structural	Acres	13,800	13,800	13,800	13,800	13,800
Structural	Number	385	385	385	385	385
Total Forest Budget [3]	MM $	98.5	101.6	97.7	109.5	106.6
Payments to State [3]	MM $	14.1	15.3	20.6	21.3	18.9
Employment [3]						
Commercial Fish	Jobs	4,925	4,925	4,925	4,925	4,925
Timber Harvest	Jobs	3,075	3,575	4,700	4,925	4,350
Recreation/Tourism	Jobs	2,925	2,925	2,525	2,650	2,550
Mining and Mineral Development	Jobs	1,100	1,100	1,100	1,100	1,100
Total [4]	**Jobs**	**15,225**	**15,725**	**16,450**	**16,800**	**16,125**
Income [3]						
Commercial Fish	MM $	161.6	161.6	161.6	161.6	161.6
Timber Harvest	MM $	119.9	138.3	181.8	190.6	169.3
Recreation/Tourism	MM $	78.9	78.9	68.1	71.5	68.8
Mining and Mineral Development	MM $	56.7	56.7	56.7	56.7	56.7
Total [4]	**MM $**	**516.6**	**535.0**	**567.7**	**579.9**	**555.9**

[1] Figures are in average annual amounts where noted. For trends beyond the first decade, see Table 2-23 at the end of this chapter.

[2] The abbreviations mean: M = thousands; MM = millions; RVD = recreation visitor day; PAOT = persons at one time; WFUD = wildlife and fish user day; MMBF = million board feet; MMCF = million cubic feet; Hr. = Hunter.

[3] Average annual.

[4] The totals include other sectors.

On a Forest-wide basis, all alternatives assign the majority of Tongass National Forest acres to land use designations which preserve or maintain the natural environment. Combining the acreages in the Wilderness and Natural Setting LUD groups for each alternative gives the percentages of lands that would be managed in an undeveloped condition. These percentages are shown in Table 2-9 (see also the alternative maps in the map packet).

Table 2-9
Ranking of Alternatives by Non-Development Land Use Designations

Alternative	Non-Development LUD's [1]
A	81%
B	77%
P	69%
D	67%
C	66%

[1] Percent of total Forest acres allocated to Wilderness or Natural Setting Land Use Designations

Although the alternatives all allocate a majority of lands in this fashion, there is considerable difference in how much. Alternatives A and B each assign over 75 percent of the land area to LUD's that will maintain natural characteristics such as scenic quality, primitive and semi-primitive recreation opportunities, undisturbed fish and wildlife habitats, and subsistence opportunities. Alternatives P, D and C provide fewer acres in these LUD's, ranging from 69 percent (Alternative P) to 66 percent (Alternative C). The 15 percent spread between Alternatives A and C equates to a difference of about 2.5 million acres.

Opportunities for resource production and use, especially timber harvest and mining, and for maintaining the corresponding contribution to local economies, are roughly the reverse of the rankings in Table 2-9. Some variation in the order results from the relative amounts of Moderate Development and Intensive Development acres for each alternative. Table 2-10 shows the allocations of the Intensive Development land use designations by alternative, again as a percent of total acres. The 19 percent spread between Alternatives D and A equates to a difference of about 3.2 million acres.

Table 2-10
Ranking of Alternatives by Intensive Development Land Use Designations

Alternative	Intensive Development LUD's [1]
D	24%
C	19%
P	15%
B	11%
A	5%

[1] Percent of total Forest acres allocated to Intensive Development Land Use Designations

In the future, in the lands managed under the Wilderness and Natural Setting groups, natural diversity and natural habitats will be maintained. In the Moderate Development and Intensive Development groups, diversity will change as a result of land- and vegetation-altering activities. Several decades into the future, large areas of the Forest would show a mosaic of timber harvest units of varying sizes and ages, interspersed with areas of old growth, riparian habitats, and wetlands.

Natural scenery will predominate within Wilderness and the Natural Setting LUD's, whereas in the Moderate Development group some evidence of alterations will be seen. The Intensive Development group will present a highly modified environment, with roads and timber harvest activities readily apparent over large areas. A wide variety of recreation opportunities will exist forest-wide under all alternatives, although changes towards more developed and road-related recreation uses will occur in areas managed under the land use designations of the Moderate and Intensive Development groups.

The comparisons will now focus on each of the ten public issues.

Scenic Quality

The management prescriptions in the Wilderness and Natural Setting LUD groups generally do not allow land-altering activities or non-natural developments. (Exceptions include fish habitat improvements and salvage logging under some prescriptions.) Lands managed under the management prescriptions in these groups would have no reductions in visual quality.

Two of the LUD's in the Moderate Development group (representing the bulk of the acres in that group) were specifically designed to address visual resource concerns: Scenic Viewshed and Modified Landscape. The management prescriptions of these LUD's allow moderate amounts of timber harvest and other activities that change the natural setting, but in ways that only slightly to moderately affect visual quality. They can be applied to areas such as those seen from the Alaska Marine Highway, or within or adjacent to recreation places, where visual quality and forest products are both important. Lands managed under the LUD's in the Moderate Prescription group could have slight to moderate reductions in visual quality. Table 2-11 gives a relative ranking of alternatives based on visual quality emphasis and the potential to maintain the natural appearance of the Forest.

Table 2-11
Alternative Comparisons: Visual Quality Emphasis[1]

Greatest Emphasis ←			→ Least Emphasis	
A	B	P	C	D

[1] Total acres in the Wilderness, Natural Setting and Moderate Development Land Use Designation groups

Lands allocated to the Intensive Development group LUD's have the potential to be extensively altered (in a visual sense) by development activities. Landscapes in these areas may be dominated by timber harvest or mineral development activities over time.

Recreation

The land use designations offer a wide variety of opportunities and settings for recreation. Those in the Wilderness and Natural Setting groups primarily offer primitive and semi-primitive opportunities in natural, unroaded settings, although some forms of traditional, motorized access are allowed (mainly by air or water). LUD's in the Moderate and Intensive Development groups offer more modified settings where access, often by road, is easier.

Not all the land area within any LUD is actually used for recreation purposes, primarily due to the difficulty of access and other geographic restrictions (steep forested slopes, icefields, etc.). The analysis of Tongass National Forest recreation use centers on identified "recreation places" where use occurs, and on the different kinds of settings for recreation, identified through the recreation opportunity spectrum (ROS) system (see discussions of these in Chapter 3, "recreation"). Opportunities under the different ROS classes are used to compare the alternatives for recreation.

Table 2-12 displays ROS capacity (in recreation visitor days) by alternative. In general, alternatives with relatively high capacity for primitive and semi-primitive types of recreation (Alternatives A and B) have a lower capacity for roaded types (although some roads may be present within some semi-primitive areas), and vice-versa (Alternatives C, P and D). Alternatives C and P have the highest total recreation capacity. Some categories of recreation, particularly boat-accessible semi-primitive motorized opportunities associated with marine settings, are at or near capacity now. Alternatives A and B are about the same in retaining the highest capacity of this type of recreation, however, demand is expected to exceed capacity in all alternatives at the end of the first decade. In all alternatives the capacity for primitive recreation and road-accessible recreation is expected to exceed demand.

Table 2-12

Alternative Comparisons: Recreation Emphasis[1]

Alternative	Primitive and Semi-Primitive ROS	Roaded Natural and Roaded Modified ROS	Total ROS
A	2,690,000	1,341,000	4,031,000
B	2,643,000	1,456,000	4,099,000
C	1,942,000	2,779,000	4,721,000
D	2,202,000	2,240,000	4,442,000
P	2,075,000	2,657,000	4,672,000

[1] Based on estimated annual recreation visitor days (RVD's) by Recreation Opportunity Spectrum (ROS) class at the end of the first decade.

Fish Habitat

The Stream and Lake Protection LUD is applied to fish streams in all alternatives except Alternative D, which gets the Fish Habitat and Water Quality Requirements LUD. Both these LUD's include the stream buffer requirements of the Tongass Timber Reform Act. As indicated in Chapter 3, no measurable effects on fisheries have been identified for any alternative. All alternatives provide for habitat improvement projects. There is no significant difference in alternatives for the fish issue.

Wildlife Habitat

All land use designations within the Wilderness and Natural Setting groups will serve to protect and maintain the natural environments for wildlife species of the Tongass. The ranking of alternatives shown in Table 2-9 indicates the relative merits of the alternatives in this regard.

Since wildlife-associated old growth is the most important habitat type of the Tongass, and the type most subject to change by resource activities, the total amount of productive old growth (currently 5.06 of the 8.64 million acres of old-growth forest), and the high-volume component

of old growth, are good indicators to use in comparing alternatives. Table 2-13 shows the percentage, by alternative, of the amount of old-growth habitat remaining after 10, 50 and 150 years of management. Comparing this table to Table 2-9 shows that Alternatives A and B maintain the highest amounts of old growth associated wildlife habitat using either indicator. Alternatives C and D maintain the least amounts of old-growth habitat, having the highest levels of intensive timber management.

Table 2-13
Alternative Comparisons: Old-Growth Habitat[1]

	Total Productive Old-Growth Habitat			High-Volume Old-Growth Habitat		
Alt.	10 Years	50 Years	150 Years	10 Years	50 Years	150 Years
A	91%	82%	77%	58%	51%	47%
B	91%	81%	74%	57%	49%	44%
C	90%	77%	68%	57%	45%	38%
D	90%	76%	67%	56%	44%	38%
P	91%	78%	70%	57%	46%	40%

[1] Percent of old-growth habitat remaining after 10, 50 and 150 years. Total Productive Old Growth Habitat is based on 5,438,547 acres in 1954 (100%) and High-Volume Old Growth of 919,661 acres in 1954 (100%). In 1990, there was 93 percent of Productive Old Growth and 61 percent of High-Volume Old Growth remaining. (High-volume old growth is that portion of the old growth in Strata C and D, as discussed in Chapter 3.)

Subsistence

Subsistence use is analyzed by three factors in Chapter 3: access, abundance and distribution, and competition. In general, alternatives that best maintain or preserve the natural environment also maintain the most subsistence opportunities, although local variations are important.

No significant restrictions on access to subsistence resources are anticipated under any of the alternatives. All alternatives, if all permitted projects are fully implemented, have the potential to affect the subsistence uses of deer, brown bear, and furbearers in terms of both abundance and distribution, and competition. In particular, increased competition from rural and non-rural subsistence users could lead to a significant restriction on subsistence resources for portions of Chichagof, Baranof and Prince of Wales Islands.

Timber Harvest

Three land use designations, Timber Production, Modified Landscape, and Scenic Viewshed, are used in the alternatives for planned and scheduled (that is, excluding salvage logging) timber harvest. The "riparian" LUD's, Stream and Lake Protection, and Fish Habitat and Water Quality Requirements, also allow scheduled timber harvest (on some Class II and Class III streams). (A small percentage of lands within the Scenic River nad Recreation River LUD's are also scheduled for harvest in some alternatives.) Within those areas, timber harvest will only occur on lands suitable and scheduled for timber harvest. Table 2-14 lists the alternatives in order of the amount of productive timber land available for timber harvest.

Table 2-14
Alternative Comparisons: Available and Suitable Timberlands[1]

Alternative	Productive Forest Lands Suitable Available	Suitable Scheduled
D	1,989,000	1,818,400
C	1,940,000	1,732,400
P	1,848,000	1,601,000
B	1,457,000	1,360,000
A	1,261,000	1,173,000

[1] Ranked by total available acres.

Forest-wide there are 2.56 million acres of available (that is, outside of areas that are Congressionally or Administratively closed to timber harvest) and suitable timber lands: the most actually available under any alternative is 1.99 million (Alternative D). The suitable scheduled lands (those actually scheduled for timber harvest to meet an alternative's objectives) also follow this pattern.

Only a percentage of acres allocated to a few of the land use designations are actually available to be considered for timber harvest. The LUD's that allow timber harvest, and the amount of suitable forest lands within each, are shown by alternative in Table 2-15. Note that in all alternatives, less than 45 percent of the areas colored green, brown or yellow on the alternative maps in the map packet would ever be harvested over the 150 year planning horizon.

Table 2-15
Suitable Acres by Land Use Designation[1]

Alternative	Scenic Viewshed	Modified Landscape	Timber Production	Riparian[2]
A	43%	36%	42%	24%
B	42%	29%	39%	24%
C	37%	29%	37%	22%
D	27%	33%	39%	23%
P	38%	34%	37%	23%

[1] The percent of suitable acres available for timber harvest within the four land use designations allowing commercial timber harvest.

[2] "Riparian" means the Stream and Lake Protection LUD for Alternatives A, B, C and P, and the Fish Habitat and Water Quality Requirements LUD for Alternative D.

The level of timber harvest (the allowable sale quantity) in the alternatives gives the same ranking as the available forest lands. This is shown in Table 2-16 for the first decade. The average rate of harvest forest-wide by alternative, based on the average annual allowable sale quantity (also first decade), is also shown in Table 2-16.

For each alternative, 12 to 15 percent of the allowable sale quantity (ASQ) is in areas that would require long-span skyline (Strata A areas only) or helicopter harvest methods. (These

are termed areas of difficult or isolated "operability.") Also, about five to eight percent of the ASQ comes from National Forest lands that are likely to be conveyed to either the State of Alaska or Native Corporations in the future.

Table 2-16

Alternative Comparisons: Amount and Rate of Timber Harvest[1]

Alternative	First-Decade Average Annual Allowable Sale Quantity (MMBF)[2]	First-Decade Average Annual Rate of Timber Harvest (Acres)
D	472	18,800
C	451	17,900
P	418	15,900
B	343	18,800
A	298	13,500

[1] Ranked by allowable sale quantity.

[2] MMBF = million board feet

Roads

Table 2-17 shows average annual new road construction by alternative for the first five decades (1991-2040). Miles of new roads correspond directly to the amount of timber harvest (Table 2-16), which is the primary activity requiring road construction.

Table 2-17

Alternative Comparisons: New Road Construction

	Average Annual New Road Construction (miles)				
Alt.	Decade 1	Decade 2	Decade 3	Decade 4	Decade 5
A	139	137	42	48	40
B	161	159	53	56	47
C	225	227	73	85	64
D	228	235	74	80	58
P	205	207	65	76	58

The opportunities for future major transportation corridors in Southeast Alaska are discussed in the Lands and Transportation sections of Chapter 3. No allocations preclude such developments under any alternative.

Minerals

Minerals access is open under the majority of land use designations, but withdrawal from new mineral entry is a part of the Wilderness, National Monument Wilderness and non-Wilderness, Research Natural Area, Enacted Municipal Watershed, and Wild River LUD's, and some Special Areas. The Wilderness LUD group accounts for the majority of withdrawn lands. Using the acres from Table 2-6, Table 2-18 ranks the alternatives in terms of access for mineral entry.

Table 2-18

Alternative Comparisons: Access for Mineral Entry [1]

Greatest Emphasis ←				→ Least Emphasis
C	D	P	B	A

[1] Ranking based on amount of lands open to mineral entry: areas not allocated to Wilderness, National Monument Wilderness and Non-wilderness, Research Natural Area, Enacted Municipal Watersheds, Wild River or Special Interest Area LUD's.

Areas with identified high potential for mineral development (see Minerals in Chapter 3) have been allocated to the Minerals land use designation variously by alternative. Alternative D provides the highest allocation, 338,300 acres. These allocations are made to recognize the importance of the mineral potential of these areas, but overlap with other LUD's which will be applied until such time as an area is developed.

Roadless Areas

The majority of Tongass National Forest lands (91 percent) are in a roadless condition, and will remain so under all alternatives. The land use designations in the Wilderness and Natural Setting groups, with only minor exceptions, will all maintain roadless characteristics, and many areas within the other LUD's will also stay roadless, due to lack of access or development potential. Total roadless acres for each alternative are shown in Table 2-19.

Table 2-19

Alternative Comparisons: Remaining Roadless Acreage[1]

Alternatives	Roadless Acres	Percent of Forest
A	14,159,100	84%
B	13,935,100	82%
P	13,503,100	79%
C	13,301,500	78%
D	13,298,300	78%

[1] Ranking based on Wilderness and roadless acres remaining after 50 years.

Local Economy

Potential effects on each of Southeast Alaska's communities are discussed in detail in Chapter 3. That analysis can't be summarized Forest-wide. The comparisons here will focus on overall employment and receipts to the State. Employment in Southeast Alaska related to National Forest lands and activities is not expected to change across alternatives, except in the timber and recreation/tourism sectors. (Other sectors include commercial fishing, sport fishing and hunting, and mining.) Predicted timber employment is directly related to the timber supply. Table 2-20 shows timber-related, recreation-related and total employment by alternative.

Table 2-20

Alternative Comparisons: Southeast Alaska Employment[1]

Alternatives	Total Employment	Timber Employment	Recreation/Tourism Employment
D	16,800	4,925	2,650
C	16,450	4,700	2,525
P	16,150	4,375	2,550
B	15,725	3,575	2,925
A	15,250	3,100	2,925

[1] Ranked by total average annual employment for decade one.

The Tongass National Forest provides 25 percent of its annual gross revenues (from timber sales, special use fees, and other revenues) to the State of Alaska. These funds are to be used for roads and schools. Gross receipts for the Tongass come almost entirely from timber sales, and are thus directly related to the timber harvest level. Table 2-16 can be used for the relative ranking of alternatives in providing payments to the State. Based on anticipated mid-market conditions (the "average" expected market value for timber), payments during the first decade are expected to range from a high of $18,100,000 (Alternative D) to a low of $12,000,000 (Alternative A).

In addition to the ten issues, three other areas will now be discussed briefly for alternative comparisons: wild, scenic and recreation rivers; research opportunities; and economic comparisons.

Wild, Scenic and Recreation Rivers

Four of the five alternatives include recommendations for rivers suitable within the theme of the alternative (see Table 2-8). Alternative A has 1,383 miles, Alternative B has 918 miles, Alternative D has 470 miles, and Alternative P has 433 total miles.

Research Opportunities

Opportunities for natural resources research are displayed by alternative in Table 2-21. Included are areas outside Wilderness and other designated areas in the Research Natural Area, Special Interest Area and Experimental Forest land use designations. These areas will be managed primarily for research-related activities, although Special Interest Areas may also have other focuses.

Table 2-21

Alternative Comparisons: Research Opportunities[1]

Alternative	Research Natural Areas	Special Interest Areas	Experimental Forests
A	53,356	121,666	11,872
B	52,895	141,757	10,812
C	37,697	7,893	17,259
D	27,646	19,885	10,812
P	37,777	123,912	10,812

[1] Acres available for research or related activities outside of Wilderness, National Monument Wilderness, LUD II, or Wild, Scenic or Recreation Rivers.

Economic Criteria

Two indicators are used to compare the alternatives for economic efficiency: total Forest budget and present net value (PNV). Table 2-22 displays these two items. The total budget corresponds closely to the level of timber management, since that is the activity requiring the highest Forest Service expenditures.

The overall indicator of long-term economic efficiency is present net value (explained earlier in this chapter). All alternatives have a positive PNV, with a difference of 16 percent between the highest (Alternative C) and the lowest (Alternative P).

Table 2-22

Alternative Comparisons: Economic Indicators[1]

Alternatives	Total Budget	Present Net Value
A	98.5	2,291
B	101.6	2,280
C	97.7	2,441
D	109.5	2,153
P	106.6	2,100

[1] All figures are in millions of 1990 dollars. Total budget is the average annual for the first decade.

A Difficult Choice

Much of the preceding discussion of issues can be expressed in one basic question: "What amount of timber to make available (or what amount of old growth to retain), and where?" On one side of the question are the concerns over scenic quality, recreation settings, fish and wildlife habitat (including old growth), subsistence use, roadless areas, and Wild, Scenic and Recreation Rivers. On the other side is the concern over timber-related employment, and its relationship to the economies of Southeast Alaska's communities.

Many of the first set of concerns (which could loosely be termed "environmental") have been addressed, and perhaps resolved, by one or more of the alternatives. Several of the land use designations were developed, and have been applied, to reduce the potential effects of timber supply on forest resources. The use of and varying success of these has been the focus of the preceding issue discussions. Of particular note, the Stream and Lake Protection or Fish Habitat and Water Quality Requirements LUD's, applied in all alternatives to areas where timber harvest will be considered, results in no new adverse effects to the fisheries resource.

The Tongass, at least in most areas where competition for resources is evident, is an old-growth forest. Past, current and future (at least for several more decades) timber harvest must occur in old-growth areas. Since 1954, when harvest began at significant levels, the amount of old growth within the Tongass has steadily declined. Subsistence opportunities, scenic quality, recreation settings, and wildlife habitat are associated with the natural condition of the Forest's old growth. Continued timber harvest of almost any amount (including that encompassed by the range of alternatives) can only occur with additional reductions in old growth. Reductions in old growth by alternative were displayed in Table 2-13.

Also beginning in 1954, the development of a Southeast Alaska timber industry has meant a significant number of jobs for the area's residents, and has resulted in the growth, even establishment, of many of the area's smaller communities. A decline in the current level of harvest opportunities from the Tongass will mean a loss of timber-related employment, and could significantly and adversely affect some of these communities.

When second-growth timber in the Forest begins to reach harvestable size, the need for old growth to sustain harvest levels will lessen. In approximately 150 years, each alternative will reach a point where no more old-growth forest need be harvested to sustain the desired timber supply. At that time, 67 percent (Alternative D) to 77 percent (Alternative A) of the 1954 amount of productive old growth will still remain: 80 to 86 percent of the total old-growth forests existing today in the Tongass.

But for the next several decades, timber harvest will be dependent on old-growth forest areas. Figure 2-3 shows the relationship between old growth harvest and timber employment for the next decade: on the average, one annual timber job equates to three to four acres of old growth harvested per year. This is a significant issue for future management of the Tongass, finding the appropriate balance between continued timber-related employment and old-growth habitat decline.

Figure 2-3

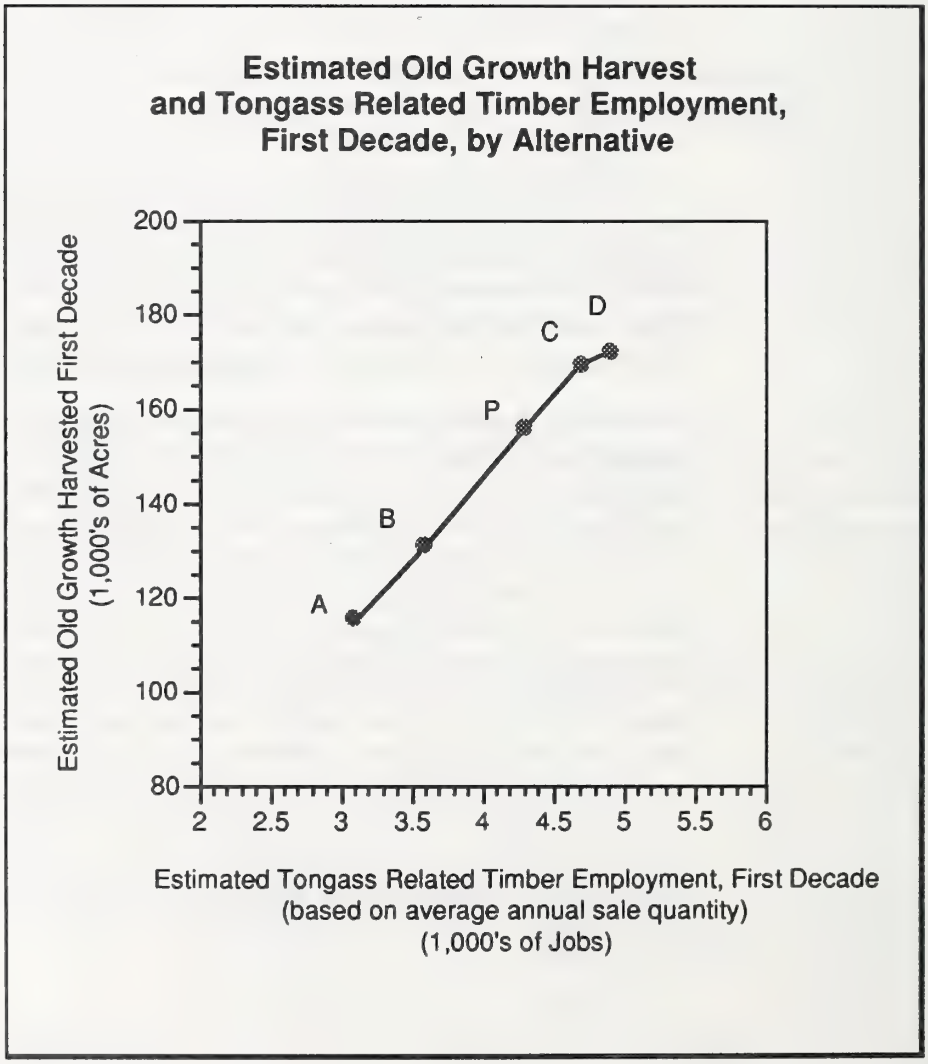


Table 2-23

Alternative Comparisons: Outputs, Effects and Trends (average annual amounts)

Outputs/Effects (Unit of Measure)	Alternative A	B	C	D	P
Recreation Capacity and Use (MRVD's/year):					
Primitive, and Semi-primitive Non-motorized ROS classes					
Capacity	1,394	1,352	964	1,130	1,012
Use	568	568	568	568	568
Semi-primitive Motorized ROS class					
Capacity	1,296	1,291	978	1,072	1,003
Use	1,296	1,291	978	1,072	1,003
Roaded Natural and Roaded Modified ROS classes					
Capacity	1,341	1,456	2,779	2,240	2,657
Use	449	449	449	449	449
Total					
Capacity	**4,031**	**4,099**	**4,721**	**4,442**	**4,672**
Use	**2,313**	**2,308**	**1,995**	**2,089**	**2,020**
% Total Productive Old Growth Remaining, Including Wilderness					
% currently remaining (1990)[1]	93	93	93	93	93
% remaining after 10 years	91	91	90	90	91
% remaining after 20 years	89	89	87	87	88
% remaining after 50 years	82	81	77	76	78
% remaining after 150 years	77	74	68	67	70
% Strata A Old Growth Remaining, Including Wilderness:					
% currently remaining (1990)[1]	100	100	100	100	100
% remaining after 10 years	99	99	99	99	99
% remaining after 20 years	98	98	97	98	98
% remaining after 50 years	91	90	87	87	89
% remaining after 150 years	85	82	77	75	80
% Strata B Old Growth Remaining, Including Wilderness:					
% currently remaining (1990)[1]	100	100	100	100	100
% remaining after 10 years	97	97	95	95	95
% remaining after 20 years	95	93	92	92	92
% remaining after 50 years	86	84	79	78	79
% remaining after 150 years	81	78	70	69	71
% Strata C Old Growth Remaining, Including Wilderness:					
% currently remaining (1990)[1]	61	61	61	61	61
% remaining after 10 years	58	57	57	56	58
% remaining after 20 years	52	52	48	47	50
% remaining after 50 years	50	48	45	43	46
% remaining after 150 years	48	45	39	39	41
% Strata D Old Growth Remaining, Including Wilderness:					
% currently remaining (1990)[1]	61	61	61	61	61
% remaining after 10 years	56	57	54	55	54
% remaining after 20 years	55	54	48	49	49
% remaining after 50 years	54	53	48	48	49
% remaining after 150 years	40	39	32	31	33

Table 2-23 (continued)

Outputs/Effects (Unit of Measure)	Alternative A	B	C	D	P
Fish Habitat Capability, Without Enhancement Projects:					
Pink Salmon (millions of smolts):					
1954	2,394	2,394	2,394	2,394	2,394
1988	2,454	2,454	2,454	2,454	2,454
2000	2,454	2,454	2,454	2,454	2,454
2150	2,454	2,454	2,454	2,454	2,454
Coho Salmon (millions of smolts):					
1954	19.1	19.1	19.1	19.1	19.1
1988	19.1	19.1	19.1	19.1	19.1
2000	19.1	19.1	19.1	19.1	19.1
2150	19.0	19.0	19.0	19.0	19.0
Dolly Varden (millions of fish):					
1954	67.9	67.9	67.9	67.9	67.9
1988	67.4	67.4	67.4	67.4	67.4
2000	67.2	67.2	67.2	67.2	67.2
2150	66.5	66.5	66.5	66.5	66.5
Allowable Sale Quantity:					
Decade 1 (MMBF)	298	343	451	472	418
Decade 1 (MCF)	72	82	108	112	100
Decade 5 (MMBF)	286	328	428	440	399
Decade 5 (MCF)	72	82	108	112	100
Long Term Sustained Yield (MCF)	106	121	153	159	143
Utility Volume:					
Decade 1 (MMBF)	57	70	90	96	84
Decade 5 (MMBF)	57	67	85	89	80
Decade 1 (MCF)	15	17	22	23	20
Decade 5 (MCF)	15	17	22	23	20
Precommercial Thinning (Acres):					
Decade 1	5,750	6,550	8,450	8,600	7,800
Decade 5	5,550	7,050	9,100	9,800	8,300
Timber Harvest by Harvest Method (Acres):					
Clearcut	11,500	13,100	16,900	17,200	15,600
Shelterwood	0	0	0	0	0
Group Selection	0	0	0	0	0
Tree Selection	400	1,900	700	1,600	300
Distribution of Timber Harvest By Strata (% of total acres harvested):					
Strata A	23	23	17	13	15
Strata B	50	50	58	60	64
Strata C	21	22	18	22	15
Strata D	6	5	7	5	6

Table 2-23 (continued)

Outputs/Effects (Unit of Measure)	Alternative A	B	C	D	P
Annual Road Construction:					
Decade 1	139	161	225	228	205
Decade 2	137	159	227	235	207
Decade 3	42	53	73	74	65
Decade 4	48	56	85	80	76
Decade 5	40	47	64	58	58
Gross Revenue from Timber Program (millions of 1990 dollars)	56.0	61.0	82.2	85.0	75.6
Total Cost of Timber Program (millions of 1990 dollars)	51.9	56.7	78.1	79.8	71.3
Net Revenue from Timber Program (millions of 1990 dollars)	4.1	4.3	4.1	5.2	4.3
1954 Red Squirrel Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	98	98	98	98	98
% remaining after 10 years	97	97	95	95	95
% remaining after 20 years	97	96	94	94	94
% remaining after 50 years	95	94	91	91	91
% remaining after 150 years	96	95	93	93	93
1954 Brown Creeper Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	63	63	63	63	63
% remaining after 10 years	59	59	57	59	59
% remaining after 20 years	55	54	50	51	51
% remaining after 50 years	54	52	47	48	48
% remaining after 150 years	49	46	39	41	41
1954 Red Breasted Sapsucker Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	96	96	96	96	96
% remaining after 10 years	94	93	90	91	90
% remaining after 20 years	92	91	87	88	88
% remaining after 50 years	86	84	78	78	79
% remaining after 150 years	80	77	69	69	72
1954 Hairy Woodpecker Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	85	85	85	85	85
% remaining after 10 years	83	82	80	79	80
% remaining after 20 years	80	79	75	74	76
% remaining after 50 years	74	72	66	65	67
% remaining after 150 years	69	66	58	57	60
1954 Marten Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	94	94	94	94	94
% remaining after 10 years	92	92	90	90	90
% remaining after 20 years	91	92	88	87	88
% remaining after 50 years	86	85	80	79	81
% remaining after 150 years	81	79	72	71	74

Table 2-23 (continued)

Outputs/Effects (Unit of Measure)	Alternative A	B	C	D	P
1954 Bald Eagle Nesting Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	92	92	92	92	92
% remaining after 10 years	92	92	92	84	92
% remaining after 20 years	92	92	92	80	92
% remaining after 50 years	92	92	92	72	92
% remaining after 150 years	92	92	92	64	92
1954 River Otter Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	93	93	93	93	93
% remaining after 10 years	93	93	93	83	93
% remaining after 20 years	93	93	93	82	93
% remaining after 50 years	93	93	93	79	93
% remaining after 150 years	93	93	93	75	93
1954 Black Bear Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	98	98	98	98	98
% remaining after 10 years	97	97	96	97	97
% remaining after 20 years	96	96	95	95	95
% remaining after 50 years	92	91	89	89	89
% remaining after 150 years	87	85	80	80	82
1954 Brown Bear Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	98	98	98	98	98
% remaining after 10 years	98	97	96	96	96
% remaining after 20 years	97	97	95	95	95
% remaining after 50 years	96	96	93	93	94
% remaining after 150 years	95	94	91	91	92
1954 Sitka Deer Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	93	93	93	93	93
% remaining after 10 years	90	90	88	87	89
% remaining after 20 years	88	88	84	84	85
% remaining after 50 years	83	81	75	74	77
% remaining after 150 years	76	74	66	63	68
1954 Wolf Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	92	92	92	92	92
% remaining after 10 years	90	90	88	88	89
% remaining after 20 years	89	89	86	86	87
% remaining after 50 years	88	84	80	79	83
% remaining after 150 years	83	79	73	71	76
1954 Mountain Goat Habitat Capability Remaining (%):					
% currently remaining (1990)[1]	100	100	100	100	100
% remaining after 10 years	99	99	99	99	99
% remaining after 20 years	99	99	99	99	99
% remaining after 50 years	99	99	99	99	99
% remaining after 150 years	99	99	98	98	98

Table 2-23 (continued)

Outputs/Effects (Unit of Measure)	**A**	**B**	**Alternative C**	**D**	**P**
1954 Vancouver Canada Goose Capability Remaining (%):					
% currently remaining (1990)[1]	95	95	95	95	95
% remaining after 10 years	94	93	91	91	91
% remaining after 20 years	93	92	89	89	89
% remaining after 50 years	87	85	81	80	82
% remaining after 150 years	82	79	72	71	75
Employment (number of jobs, first decade):					
Commercial Fishing	4,925	4,925	4,925	4,925	4,925
Timber Harvest:					
National Forest Timber	3,075	3,575	4,700	4,925	4,350
Other Harvest	825	825	825	825	825
Total Timber Employment	**3,900**	**4,400**	**5,525**	**5,750**	**5,175**
Recreation/Tourism	2925	2925	2525	2650	2550
Mining and Mineral Development	1,100	1,100	1,100	1,100	1,100
Sport Fishing	1,450	1,450	1,450	1,450	1,450
Big Game Hunting	925	925	925	925	925
Total Employment	**15,225**	**15,725**	**16,450**	**16,800**	**16,125**
Income (millions of 1990 dollars, first decade):					
Commercial Fishing:	161.6	161.6	161.6	161.6	161.6
Timber Harvest:					
National Forest Timber	119.9	138.3	181.8	190.6	169.3
Other Harvest	31.9	31.9	31.9	31.9	31.9
Total Timber Income	**151.8**	**170.2**	**213.7**	**222.5**	**201.2**
Recreation/Tourism	78.9	78.9	68.1	71.5	68.8
Mining and Mineral Development	56.7	56.7	56.7	56.7	56.7
Sport Fishing	42.6	42.6	42.6	42.6	42.6
Big Game Hunting	25.0	25.0	25.0	25.0	25.0
Total Income	**516.6**	**535.0**	**567.7**	**579.9**	**555.9**

[1] 1954 was the start of large-scale timber harvest on the Tongass; therefore, the 1954 condition is assumed to be 100 percent.

Chapter 3

Environment and Effects

Chapter 3

Environment and Effects

Introduction

This chapter combines the "Affected Environment" and "Environmental Consequences" discussions required by the National Environmental Policy Act implementing regulations (40 CFR 1500). Each resource is first described by its current condition, uses, supply, and demand or expected use along with an explanation of how each resource is measured and evaluated. The descriptions are limited to providing the background information necessary for understanding how Forest Plan alternatives may affect the resource. Two new sections have been added to most resource sections for this Supplement. One describes changes that have occurred since the 1990 draft environmental impact statement; the other is a discussion of methodology and scientific accuracy.

Analyzing Effects

Following each resource description is a discussion of the potential effects (environmental consequences) to the resource associated with implementation of each alternative. All significant or potentially significant effects, including direct, indirect and cumulative effects are disclosed. Effects are quantified, where possible, although qualitative discussions may also be included. The means by which any identified potential adverse effects will be reduced or mitigated are also described.

Environmental consequences are the effects of implementing an alternative on the physical, biological, social, and economic environment. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity but would be significant in the foreseeable future. Cumulative effects result from the incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

Potential adverse environmental effects which cannot be avoided are discussed. Unavoidable adverse effects are those resulting from managing the land for one resource at the expense of the use or condition of other resources. Many adverse effects can be reduced or mitigated by limiting the extent or duration of effects. The Forest-wide standards and guidelines specify mitigation measures for project activities to be implemented under the Proposed Revised Forest Plan. These are discussed throughout the chapter, and in detail in the Proposed Revised Forest Plan.

Short-term uses (effects) are those that occur annually or within the first ten years of Forest Plan implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services for 50 year and beyond.

Irreversible and irretrievable resource commitments are normally not made at the programmatic level of a Forest Plan. Irreversible commitments are decisions affecting non-renewable resources such as soils, minerals, plant and animal species, and cultural resources. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. While the application of Land Use Designations (LUD's) allowing land-altering activities can indicate the potential for such commitments, the actual commitment to develop, use or affect non-renewable resources is made at the project level. The gradual decline in old-growth habitat would be considered an irreversible commitment.

Irretrievable commitments represent opportunities foregone for the period during which resource use or production cannot be realized. These decisions are reversible, but the production opportunities foregone are irretrievable. An example of such commitments is the allocation of LUD's that do not allow timber harvest to areas containing suitable and accessible timber lands. For the time over which such allocations are made, the opportunity to produce timber from those areas is foregone, thus irretrievable. Irreversible and irretrievable commitments are not identified, as such, in the discussions.

The assumption that the kinds of resource management activities allowed under the LUD's will in fact occur to the extent necessary to achieve the goals and objectives of each alternative has been made for estimating the effects of alternatives at the programmatic Forest Plan level. However, the actual location, design and extent of such activities is not known at this time; that is a project-by-project decision. Thus, in many cases the discussions refer to the potential for effects to occur, realizing that, in many cases, these are only estimates. The effects analysis is useful for comparing and evaluating alternatives, but should not be applied per se to any specific location within the Forest.

In analyzing and evaluating the potential effects from timber harvest activities, keep in mind that the LUD's allowing different levels of timber harvest apply to broad land areas. These areas typically include both suitable and unsuitable timber lands. Within any given area allocated to one of these LUD's, the actual acres harvested will be less than the total acres. Each alternative map in the map packet displays the available lands within the land use designations where timber harvest may occur. As discussed under Timber and in Chapter 2, only a portion of the available lands is needed to meet the timber supply objectives of the alternatives. Selection of suitable acres for harvest is once again a project-level decision.

Land Use Designation Groupings

For many resources, the effects, and the differences in effects by alternative, are best identified through the land use designation allocations. While each LUD has a different purpose and management emphasis, many are similar in the kinds of effects they would potentially create. Based on this concept, and in order to simplify the identification of effects, the land use designations have been grouped into four categories: Wilderness, Natural Setting, Moderate Development, and Intensive Development.

Table 3-1 displays the land use designation groupings. Each alternative map also uses these groupings to show the LUD allocations, and LUD's are color-coded by group. The reader will find it useful to have these maps available when reading the effects discussions. Table 3-1 excludes the Transportation and Utility Systems LUD, since it does not have acreages assigned. This LUD is displayed on the Long-Term Sale Boundaries, Timber Sale Schedule, and Transportation and Utility Corridors map included in the map packet.

Table 3-1
Land Use Designation groupings used to discuss effects

Group	Land Use Designation
Wilderness	Wilderness National Monument Wilderness National Monument Nonwilderness
Natural Setting	Research Natural Areas Primitive Recreation Special Interest Areas Old-Growth Habitat Beach Fringe and Estuary Enacted Municipal Watersheds Other Areas LUD II Semi-Primitive Recreation Wild Rivers Scenic Rivers Recreation Rivers
Moderate Development	Experimental Forests Scenic Viewshed Modified Landscape Stream and Lake Protection Fish Habitat and Water Quality Requirements
Intensive Development	Timber Production Minerals

Land Divisions

The land area of the Tongass National Forest has been divided up in several different ways to describe the different resources and how they are affected by Forest Plan alternatives. These divisions vary by resource since the relationship of each resource to geographic conditions and zones also varies. Four of these are used for more than one resource, and are described briefly here (more complete descriptions appear elsewhere in the document, as noted).

Geographic Provinces. These are seven large land areas that are distinguished by differences in ecological processes. They are defined by a combination of climatic and geographic features. Geographic provinces are used in the Biological Diversity, Research Natural Area, and Wild and Scenic River sections. See Research Natural Areas for a description of each province.

Ecological Provinces. These are areas within which certain kinds of plants and animals tend to occur together. They are defined by a combination of similarity in species, patterns of distribution of species, and natural characteristics or barriers. Twenty-one ecological provinces occur on the Tongass. They are used in the Biological Diversity and Wildlife sections.

Administrative Areas. The Tongass National Forest, for management purposes, is divided into three Administrative Areas. They correspond roughly to the north, central and southern portions of the Forest. Several resources, including fish, old-growth forests, recreation,

roadless areas, wildlife and timber, use these divisions for describing effects. Administrative areas were described in Chapter 1.

Management Areas. The current Tongass Forest Plan divides the Forest into 141 management areas, each with area-specific direction and activity schedules. The Forest Plan Revision did not use these areas for those purposes. The Tongass Timber Reform Act directed that "proportionality" (see Chapter 1, and the timber section of this chapter) be analyzed using the 141 management areas. The 141 areas are, therefore, preserved, and are used to ensure that the proportionality requirement is met. Management areas are also used in the Fish section of this chapter.

Value Comparison Units. These are distinct geographic areas, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow watershed divides. Value comparison units (VCU's) were used for the 1979 Forest Plan, and are shown on the "no action" alternative map in the map packet. The Forest contains 867 VCU's. They are used to describe the locations of specific resources on the Forest.

Wildlife Analysis Areas. These are land divisions used by the Alaska Department of Fish and Game. Approximately 190 apply to the Tongass National Forest. They are used in the Subsistence and Wildlife sections.

The Tongass National Forest has developed a computerized geographic information system (GIS) for the revision of the Tongass Plan. This system makes it possible to do spatial analysis of alternatives and effects, and to rapidly display resource information in map format. The GIS is a large data base, containing information on many of the resources of the Forest. Much of the data consists of map "layers," each representing a particular resource or attribute (such as vegetative species, soil types or recreation places). Numerical data can also be stored, displayed and analyzed. The GIS data base is referred to as the "Revision data base" when referenced in this chapter.

General Forest Description

A brief description of the physical, biological and socio-economic settings of the Tongass National Forest is now given. Chapter 1 and the alternative maps include a location map.

Physical Setting

The mainland and many of the islands of Southeast Alaska are mountainous, often rising abruptly from sea level to several thousand feet. Elevations of forested areas extend up to approximately 3,000 feet in the southern sections of the Forest, and up to 2,500 feet further north. The mountain valleys provide reservoirs for huge ice fields and glaciers, located primarily on the mainland.

More than one million years ago, all but the highest mountain peaks in Southeast Alaska were covered by ice. The great erosional powers of these vast expanses of ice molded and shaped the landscape as the glaciers moved downhill under their own weight, carving the bedrock below them. When the ice receded and uncovered the land, the more resistant mineral-rich rocks remained, revealing a network of islands dissected by numerous streams, U-shaped valleys, and fiords. It is this modification by glaciers that gives Southeast Alaska's landscape its unique character.

The configuration of the coastline, the warm Japanese ocean current, and the high coastal mountains provide the factors necessary to produce abundant rainfall. The annual precipitation of Southeast Alaska averages more than 100 inches throughout. Precipitation is highest in the southern areas, and decreases as one moves north. At higher elevations, more than 200 inches of snow may fall annually, perpetuating the existing icefields and glaciers. Storms and

moderate to heavy precipitation occur year-round, but most commonly from September through November. The abundant moisture feeds numerous streams, rivers, and lakes which dot the landscape.

Southeast Alaska has a maritime climate, resulting from the moderating influence of the Pacific Ocean. In the summer, this provides a cooling influence, while in winter, temperatures are warmer than would be expected for these latitudes. Normal temperatures range from the mid-40's to the mid-60's in the summer, and from the high teens to the low-40's in the winter. During the warmer months, temperatures are highest inland and lowest along the coasts, while in the colder months, the reverse is true.

Biological Setting

The coastal forest of Southeast Alaska is part of the cool, temperate rain forest that extends along the Pacific coast from Northern California to Cook Inlet in Alaska. Most of the forest is composed of old-growth conifers, primarily western hemlock and Sitka spruce, with a scattering of mountain hemlock, western redcedar (in the south) and Alaska yellow-cedar. Red alder is common along streams, beach fringes, and on soils recently disturbed by logging and landslides. Black cottonwood grows on the floodplains of major rivers and recently deglaciated areas on the mainland. Subalpine fir and Pacific silver fir occur occasionally at tree line and near sea level.

Blueberries, huckleberry, Sitka alder, Devil's club, and salal are common shrubs in the forest. The forest floor is composed of plants such as deerheart, dogwood, single delight and skunk cabbage. Because of the high rainfall and resulting high humidity, mosses grow in great profusion on the ground, on fallen logs, on the lower branches of trees, and in forest openings.

Grass-sedge meadows usually lie at low elevations, often along the coast. Stands of willows border many of the stream channels. Interspersed throughout the forest are muskeg (or bog plant) communities, dominated by sphagnum mosses and sedges.

The alpine zone usually lies above 2,500 to 3,000 feet. It occupies the area above the coastal forest and is separated from the forest by a subalpine or transition zone. Resident plants have adapted to snowpack and wind abrasion by evolving low-growth forms. Low, mat-forming vegetation covers most of the area, with cushion-like plants occupying crevices on exposed rock outcrops and talus slopes.

The forests, shorelines, streams, and rivers of Southeast Alaska provide habitat for over 300 species of birds and mammals, including both game and non-game animals such as brown and black bear, Sitka black-tailed deer, moose, wolf, mountain goat, beaver, otter and marten. The coastline provides an ideal habitat for a large population of bald eagles, and wetlands provide nesting habitat for many waterfowl.

A highly productive marine environment includes an abundance of marine mammals, halibut, herring, and hundreds of shellfish. Both resident and anadromous fish are found within and adjacent to the Forest, including all five species of Pacific salmon, Dolly Varden, and trout.

Socioeconomic Setting

Southeast Alaska's communities and individuals make up a variety of cultures. The abundant resources of the forests and waters have provided food, shelter, and livelihood for to its peoples for thousands of years. The first inhabitants of the area, the Tlingit and Haida, adapted well to the coastal environment and developed a rich culture. The numerous waterways allowed for

mobility which aided in expanding trade and gathering food.

In the 1700's, Russian exploration began in Alaska. The fur trade, primarily sea otter pelts, was the main force driving colonization. When most of the sea otter populations were depleted, the fur industry declined, and Russia lost interest in its North American colony. Alaska was sold to the United States in 1867.

Colonization continued under United States ownership, and new industries developed. In the late 1800's commercial fish canning became an important part of the economy of Southeast Alaska. During that same period the discovery of gold brought thousands of miners to the area, and many were followed by their families. The most important of the early discoveries occurred in Juneau. In the early 1900's, the Depression brought a decline in mining employment, and the impact of World War II resulted in the closures of the last remaining mines.

The timber resource was used by the earliest inhabitants in a variety of ways. The Russians harvested timber for building ships and structures, but commercial timber harvest was not developed until the 1900's. In the earlier part of the century small timber mills operated in a few communities, and during the 1950's two large-scale pulp mills were developed in Ketchikan and Sitka, and the timber industry became a major economic component of Southeast Alaska's economy.

In the 1950's Alaska focused its attention on statehood, and on January 3, 1959 became our 49th state. This resulted in an increase in government employment, and, coupled with the growth of the timber industry, a gradual shift towards a more diversified economy, with less dependence on non-renewable resources.

Most of the population of Southeast Alaska is concentrated in several urban communities, the largest being Juneau, Ketchikan, Sitka and Petersburg. The same industries most important to Southeast Alaska's history: fishing, mining, and timber production, are still prominent in most of the urban communities. Tourism, which has increased in recent years, provides another important source of income, as do government, education and transportation. There are also many small, rural communities which depend primarily on fishing, timber production and subsistence uses.

Air

Affected Environment

Changes Since the DEIS

There have been no changes to this section.

Background

The air quality of the Tongass National Forest is rated as high. The prevalent airflow from the Pacific Ocean, the small amount of industrial development in Southeast Alaska, and the absence of large population centers all contribute to the high quality of the air. Forest activities have historically had little effect on air quality.

The State of Alaska Department of Environmental Conservation has the primary responsibility for attainment and maintenance of Ambient Air Quality Standards under the provisions of the Clean Air Act (42 U.S.C. 7401 et. seq.). Air quality is managed by airsheds. Airsheds are geographic areas, which because of topography, meteorology, and climatic conditions, share the same air mass. Airsheds are classified by their degree of protection from future air quality degradation. Airsheds are classed as I, II, or III.

The Clean Air Act designates as mandatory Class I areas each National Park over 6,000 acres and each national Wilderness over 5,000 acres that existed as of the date of enactment of the Clean Air Act (August 7, 1977). Wilderness and additions to Wildernesses designated by law after this date are not Class I areas unless they have been redesignated as such.

To date, the Alaska Department of Environmental Conservation has not classified any areas in Southeast Alaska as Class I airsheds. The entire Tongass National Forest, including the National Monuments and Wildernesses, is a Class II airshed. Class II airsheds do not have specific attainment criteria under the Clean Air Act. Specific management standards can be established for airsheds of the Tongass to support Wilderness or other land unit objectives.

Direction for air resource management is found in FSM 2580 and FSM 2120. The Forest Service has a statutory responsibility to protect National Forest lands from on and-off-forest air emission sources. Five roles for the Forest Service in air resource management are:

1. To minimize the impacts, if any, of management activities (such as prescribed fire or vehicle use) on air resources on National Forest lands.
2. To inventory the air resource condition and monitor the effects of emissions.
3. To coordinate with State and local regulators and assure that applicable air quality regulations are met when permits are granted for activities involving National Forest lands.
4. To review the requirements for proposed new emission sources as Federal land managers under the "Prevention of Significant Deterioration" permitting process.
5. To improve management through research on various aspects of the air resource, such as measuring air quality and assessing effects on forest health.

Methodology and Scientific Accuracy

There is little scientific information on the baseline air quality of the Tongass. We do not know enough about the current conditions or trends of air resources in Southeast Alaska to quantitatively describe this resource or the affected environment in detail. Lichen inventories and limited chemical analysis have been completed on several sites. The Environmental Protection Agency and Alaska Department of Environmental Conservation have considerable air quality data associated with the regulation of certain industrial sites. On the whole, however, the air resource in Southeast Alaska has not been described.

There is also little information on the effects, if any, of ambient air quality on forest resources in Alaska. Forest health monitoring recently initiated under a national resource program includes air resource related parameters. Inventory methodologies are being developed and considered to address this information need.

Environmental Consequences

Direct, Indirect and Cumulative Effects

It is unlikely that future economic development in Southeast Alaska will significantly change air quality conditions. Expected air quality effects from forest management activities are temporary and limited in nature, resulting from dust and vehicular emissions from logging operations, public travel on Forest roads, and smoke from a limited prescribed fire program. The development of mines in the Juneau Goldbelt, and activities associated with permitted uses such as community incinerators or tour boats, could have a limited potential for local air quality effects. Smoke from prescribed fires is managed by developing burning plans and prescriptions to minimize environmental effects, including effects on air quality. No significant adverse effects on air quality are anticipated under any of the alternatives.

Biological Diversity

Affected Environment

Changes Since the DEIS

Twenty-one ecological provinces have been identified, described and mapped to help display historical, existing, and estimated future changes in elements of biological diversity.

Background

The National Forest Management Act (NFMA) defines diversity as the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. Biological diversity encompasses the variety of life in an area, including the variety of genetic stocks, species, plant and animal communities, ecosystems, and processes through which individual organisms interact with one another and their environments.

National Forests are ecosystems and their management for goods and services requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems. NFMA provides the following direction for diversity (36 CFR 219.26): "Forest Planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices."

Fish and wildlife habitat is to be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population is one which has the estimated numbers and distribution of reproductive individuals needed to insure its continued existence, well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support at least a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area (36 CFR 219.19).

Methodology and Scientific Accuracy

To display qualitative and quantitative biological diversity in the Forest planning process, nine "elements" of biological diversity have been developed (Figure 3-1) (Orme, et al., 1989; Samson 1991). These nine elements describe the ecosystems, ecological processes, and variety of life in Southeast Alaska. These nine elements also provide the framework for displaying how diversity will be affected by various mixes of resource outputs and uses among different resource management alternatives.

Figure 3-1

Nine Elements of Biological Diversity
Ecological Provinces
Ecological Processes
Plant Associations and Vegetative Conditions
Total Number of Plant & Vertebrate Species
Species Extinctions and Introductions
Species Abundance & Distributions
Management Indicator Species
Habitat Fragmentation
Species Vulnerability

Ecological Provinces

Biogeography is an old science founded by the explorer-naturalists who attempted to describe the distributions and forms of plants and animals around the world. Virtually all the biogeographers, from the early founding fathers to the present, suggest that all living organisms are endemic or restricted to a particular area, certain kinds of plants and animals tend to occur together and, that these precepts are the basis for the system of biogeographic regions and provinces.

More recently, the province has been defined in ecological terms and the ecological province is of growing interest in land management and conservation of natural resources. The ecological province is characterized by three traits (Brown and Gipson, 1983). First, species composition in each province is more similar than between adjacent provinces. Second, patterns in distribution are true for many kinds of organisms, for example, fish, amphibians, mammals, birds, plants and so on. Third, historical events such as glaciers, uplifting of lands, and so on are important both to the nature of a province and to the barriers that distinguish each province.

Dasmann (1973) and since 1975, the International Union for Conservation of Nature, UNESCO of the United Nations, and the World Conservation Strategy, suggest using a biogeographic classification system for the inventory and wise use of natural resources. Since then, Samson and Knoph (1982), Allen, et al. (1984), Noss and Harris (1986), Noss (1990), Urban, et al. (1987), among others, provide further support for using a top-down biogeographic approach in land management, including Alaska (Samson, et al., 1989). The Gap Analysis approach adopted by the U.S. Fish and Wildlife Service and 12 cooperating states incorporates the biogeographic province (Scott, et al., 1990) as part of an approach for the conservation of biological diversity. This is another example of using biogeographic provinces in land management.

Tongass National Forest. The temperate rainforest biome extends along the Pacific Coast and includes the northern California redwoods to the Sitka spruce of coastal Alaska. The climate is cool and maritime, with abundant winter rainfall and much summer cloudiness and fog (Whittaker, 1970).

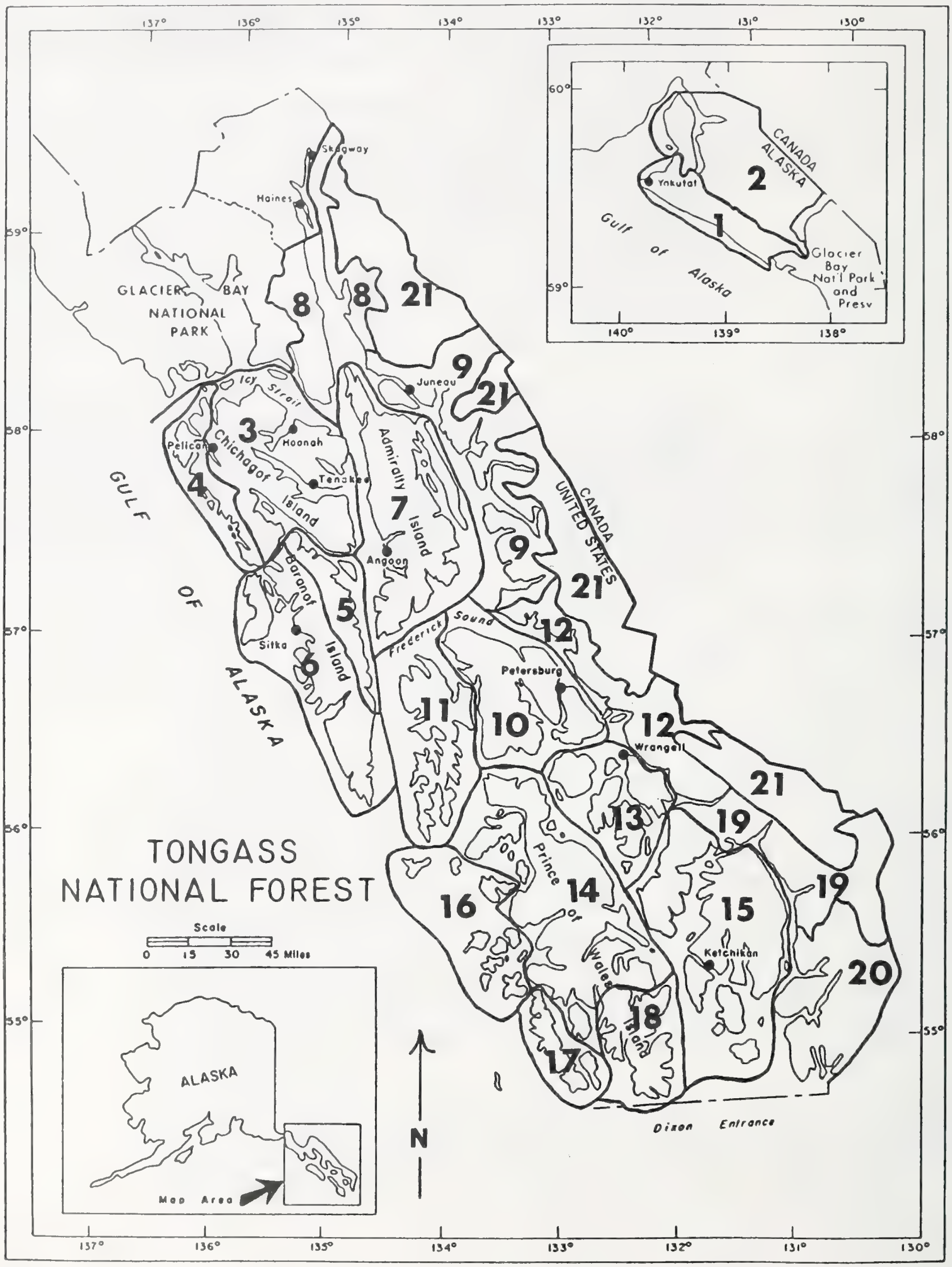
The Tongass National Forest is within the spruce-hemlock-cedar temperate rainforest region of the temperate rainforest biome. The Southeast Alaska coastal portion of this temperate rainforest region extends from Yakutat Bay to northern Vancouver Island and is referred to as the Alexander Archipelago. Summer rainfall is 10-20 percent of the annual precipitation. The climate is cool and wet, but summers are warmer and there is less persistent snowpack than in the sub-boreal temperate rainforest region which extends north from Yakutat Bay. Western hemlock, Sitka spruce, western redcedar and yellow cedar are major forest tree species.

Over 50 vertebrate subspecies are endemic (native) to the temperate rainforest (Hall and Kelson, 1959; American Ornithologists Union 1982; Honacki, et al., 1985; Antell 1987; Nagorson 1990). Island ecosystems have long been characterized for a high level of endemism (MacArthur 1972). Furthermore, many animal subspecies in Southeast Alaska are unique to one or more islands (Hall and Kelson, 1959). Other more common species exhibit unique island-dependent patterns in distribution. One example is the brown bear found on some, but not all, islands in Southeast Alaska. Another is the Alexander Archipelago wolf. This small, dark wolf is unique to Southeast Alaska and, like the brown bear, is found on some, but not all, islands in Southeast Alaska. A cooperative agreement with The Nature Conservancy signed in 1990 will provide a review of the number and distribution of vertebrates in Southeast Alaska.

Twenty-one ecological provinces have been identified, described and mapped to inventory and manage natural resources in Southeast Alaska (Figure 3-2). These provinces were developed in cooperation with the Alaska Department of Fish and Game, Forest Service Research, and the Tongass National Forest, and build on the interagency cooperative effort described by Samson, et al. (1989). The provinces are in accordance with the province definition of Brown and Gipson (1983) and provide a framework, as in other areas of the United States, to estimate population viability (Thomas, et al., 1990), conserve biodiversity (Scott, et al., 1990), and for other land management needs (Crumpacker, et al., 1988).

Figure 3-2

Ecological Provinces of Southeast Alaska



Descriptions of the 21 ecological provinces are:

1. Yakutat Forelands Province

Location - This province encompasses the nearly flat glacial outwash plains to the south and east of Yakutat.

Physical Features - Very youthful, nearly flat landscape with extensive flooding and active isostatic rebound. Most surfaces vary from 200 to 1,500 years old. Dune formation and succession are ongoing processes due to glacial rebound and wave action.

Biological Features - Sitka spruce, alder, and cottonwood are abundant on well-drained, recently deglaciated and active fluvial surfaces. Plant community patterns reflect a diverse mosaic of naturally-occurring older and young forests, shrublands, bogs, and meadows. This mosaic is largely due to particle size distribution of the surficial deposits remaining after the last glacial period. The fine sediment surfaces are dominated by bogs, while the well-drained coarse material is dominated by Sitka spruce forests. Roche moutonnees (bedrock hills overridden by past glaciers) are dominated by older western hemlock forests. Shore pine occurs only in the Pike Lake area. Several vertebrate endemics are shared with the Yakutat/Glacier Bay Upland Province and include, among others: a water shrew (*Sorex palustris ssp. navigator*), tundra vole (*Microtus oeconomus ssp. yakutatensis*), black bear (*Ursus americanus ssp. emmonsii*), marten (*Martes americana ssp. kenaiensis*), ermine (*Mustela erminea ssp. arctica*), and two red-backed voles (*Clethrionomys gapperi ssp. dawsoni and glacialis*).

2. Yakutat/Glacier Bay Upland Province

Location - This province encompasses the upland areas and Russell Fiord area to the north, east and south of Yakutat, and Glacier Bay National Park.

Physical Features - Climate varies from very wet hypermaritime along the coast to very wet maritime inland. Mountains to over 10,000 feet rising abruptly from sea level, extensive active glaciers, and fiords dominate this landscape.

Biological Features - Glacier Bay National Park has been designated a Biosphere Reserve as part of the IUCN (International Union for the Conservation of Nature) Biosphere Reserve Program. Sitka spruce, alder, and cottonwood are abundant on well-drained, recently deglaciated and active fluvial surfaces. Alpine and lichen over rock plant communities dominate the land from 2,000 to over 10,000 feet elevation. Bogs are common on poorly drained older surfaces near Gustavus.

3. East Chichagof Island Province

Location - This province encompasses all lands on eastern Chichagof Island from a line drawn from near Pelican to Sergius Narrows (in VCU 287). Pleasant and Lemesurier Islands are included in this province.

Physical Features - Climatically, this province is drier and colder than the outer coast of Chichagof Island. Winter snow pack is generally greater. Chichagof Island is deeply dissected by Freshwater Bay, Peril/Lisianski Straits and Port Frederick. These deep dissections create three peninsulas which could be functioning biologically more like separate islands.

Biological Features - Vegetation in this province represents a more modal condition, similar to the Admiralty Island Province. Extremes due to outer coastal influences, volcanic ash, or strong continental influences don't seem to exist.

4. West Chichagof Island Province

Location - This province encompasses Yakobi and Inian Islands, the western shore of Chichagof Island from near Pelican and southeast along the divide between the coast and Lisianski Inlet/Peril Strait to Sergius Narrows (in VCU 287) through Salisbury Sound and north back to Pelican. This province contains most of the West Chichagof-Yakobi Wilderness.

Physical Features - This province is dominated by a very wet hypermaritime climate and is nearly entirely exposed to outer coastal storms and weather. Winter snowpack at low elevations is generally low compared to inland areas. Hundreds of small islands dot the coast. Topography is gentle when compared to the mountains of Baranof Island and the coastline is highly irregular. Volcanic ash from Mt. Edgecumbe overrides much of the glacial till and bedrock in the southern portion of this province.

Biological Features - The Sitka spruce/Pacific reedgrass plant association is abundant along the outermost coastal fringe. Otherwise, vegetation is similar to the other northern islands. Deer are abundant and reach the northern limit of their natural range.

5. East Baranof Island Province

Location - This province encompasses Catherine Island and all lands on Baranof Island east of a line from Fish Bay (in VCU 287) along the divide to Patterson Bay (in VCU 283).

Physical Features - Climatically, this province is colder than West Baranof or eastern Chichagof Island. Mountain glaciers occur along the divide between east and west Baranof. The only glacially-silted river (Glacial River) that occurs on an island in Southeast Alaska occurs in this province. Topography is rugged and steep to saltwater. Little flat land occurs. Catherine Island is climatically and topographically more similar to Chichagof and Admiralty Islands. Catherine Island is, however, connected to Baranof across an estuarine grassflat. Only during extreme winter high tides is Catherine Island actually separated from Baranof Island.

Biological Features - The distribution and abundance of plant associations on Eastern Baranof Island is more similar to much of the mainland due to the steep topography and cold environment. Spruce, devil's club, salmonberry forest associations are common on avalanche and steep erosional slopes. Shrublands of alder and salmonberry and other disturbance plants are also common. Overall forest productivity is low compared to Admiralty and Chichagof Islands. Alpine and rock/lichen plant communities are abundant.

6. West Baranof Island Province

Location - This province encompasses Kruzof Island, western Baranof Island from Fish Bay south along the divide to Patterson Bay on the east side of Baranof, and around the southern tip of Baranof back to Fish Bay. Most of the south Baranof Wilderness Area occurs within this province.

Physical Features - Climatically, this province is similar to the West Chichagof Island province with the exception of southern Baranof where precipitation exceeds 250 inches per year. Topographically, Baranof Island is the most rugged of all the islands in Southeast Alaska. The southern half of this province is highly dissected by steep-sided fiords. The outer coast, like west Chichagof Island, is dotted with hundreds of small islands. Volcanic ash blankets most of the northern half of this province.

Biological Features - All forest plant associations except those in the western redcedar series and those found around large mainland rivers occur in this province. Kruzof Island has some unique vegetation communities which have not been classified.

7. Admiralty Island Province

Location - This province encompasses Admiralty Island.

Physical Features - Topographically and climatically this province represents a modal environment. Topography is relatively gentle, rainfall is moderate, and winter conditions are moderated by the surrounding marine environment. Winds from Chatham and Icy Straits, Lynn Canal, and off the mainland are often severe.

Biological Features - The Wilderness portion of Admiralty Island has been designated a Biosphere Reserve as part of the IUCN (International Union for the Conservation of Nature) Biosphere Reserve Program. All forest plant associations except those in the Western redcedar series, those found around large mainland rivers, and those occurring only on outer coastal areas occur in this province. Overall forest productivity is high. Fresh and saltwater marshes are abundant in the numerous bays and inlets. Alpine and bog communities are abundant. A subspecies of ermine (*Mustela erminea ssp. salva*) is unique to Admiralty Island as are races of king salmon such as those of King Salmon Creek and Wheeler Creek. Brown bear populations have been estimated at one bear per square mile.

8. Lynn Canal Province

Location - This province encompasses the mainland on the east and west sides of Lynn Canal. On the east side of Lynn Canal, it extends from near Eagle River northward; on the west side, it includes the Chilkat Peninsula to the boundary of Glacier Bay National Park. Islands within Lynn Canal are also included.

Physical Features - Rain shadows and the dominating influence of the continental climate make this the driest and seasonally warmest (summer isotherm greater than 52°F) province in Southeast Alaska. Precipitation is generally less than 60 inches per year. The topography is rugged and glaciated. While the Chilkat Peninsula is included in this province, the southern portion is more similar to the Eastern Chichagof Island Province.

Biological Features - Western and mountain hemlock, and Sitka spruce plant associations are common. Alder, cottonwood and pine are abundant in the northern portion. Paper birch is found in the northern most portion of the province. Cedar is absent. Alpine tundra and extensive rock/lichen communities dominate much of the land from 2000 to over 8000 feet. Mountain goats, brown and black bear are common with deer uncommon. A deer mouse (*Peromyscus maniculatus ssp. algidus*) is endemic to the area.

9. Northern Coast Range Province

Location - This province encompasses lands on the mainland from Eagle River south to Cape Fanshaw. Douglas Island is included in this province.

Physical Features - Climatically, like the Lynn Canal province, this province has little maritime influence. Topography is most similar to the eastern portion of the Lynn Canal Province, rugged and glaciated. The Taku and Whiting Rivers extend into Canada. The Taku River provides a major low elevation corridor into the more continentally-influenced environment. The Whiting River extends into Canada a short distance and its origin is in the rugged coast range, hence it is not a major low elevation corridor as is the Taku River.

Biological Features - No redcedar or salal plant associations occur, indicating a cooler climate than the more southerly mainland provinces. Yellow-cedar plant associations occur in this province.

10. Kupreanof/Mitkof Islands Province

Location - This province encompasses all of Kupreanof, Mitkof and Woewodski Islands.

Physical Features - The climate is cooler and the winter snowpack is greater than on Prince of Wales Island to the south. The eastern edge of this province is strongly influenced by winds and loess out of the Stikine River and from the mainland.

Biological Features - All forest plant associations except those in the Western redcedar series and those occurring only on outer coastal areas occur in this province. This province contains the highest percentage of acreage in muskeg wetlands than any other province. Overall forest productivity is moderate. Deer and wolves are moderately abundant.

11. Kuiu Island Province

Location - Encompasses all of Kuiu Island and numerous adjacent small islands.

Physical Features - Kuiu Island is deeply dissected creating several prominent peninsulas. The topography is gentle compared to neighboring Baranof Island or the mainland. The climate is cooler and winter snowpack is greater than the Prince of Wales Province to the south, yet the climate is milder than the mainland or islands nearer the mainland in this region. However, the western portion of Kuiu Island is subject to severe windstorms from both the ocean and Chatham Strait.

Biological Features - Most forested plant associations identified in Southeast Alaska occur in this province, however, plant associations found in outer coastal environments dominate. Due to the pelagic marine exposure on the southwestern portion of the province, habitat exists for the Peale's peregrine falcon. The province also has significant sea otter populations. A subspecies of marten (*Martes americana ssp. nesophila*) is endemic to Kuiu.

12. Central Coast Range Province

Location - This province encompasses lands on the mainland from Cape Fanshaw south along the coast to Bradfield Canal. The Stikine-Leconte Wilderness is located within this province.

Physical Features - Climatically, this province is warmer than the northern coast range province. Summer isotherms range from 51 to 52°F. Topography is similar, but overall less precipitous than the northern coast province. The Stikine River system is located in the center of this province and has a major continental influence.

Biological Features - Plant associations found along saltwater are similar to those occurring elsewhere in northern Southeast Alaska except for those near the mouth of the Stikine River. Here, unique plant associations subject to high winds carrying loess can be found. The northern limits of redcedar and salal occur in this province. The Stikine River is the largest river system connecting coastal Southeast Alaska with the interior. This system provides a migration corridor for plant and animal species.

13. Etolin Island and Vicinity Province

Location - All of Etolin, Zarembo, Wrangell, Waronkofski, and Deer Islands and Vank, Rynda and the other small islands off the mouth of the Stikine River are contained in this province.

Physical Features - Similar to the Kupreanof/Mitkof Islands Province. This province is subject to strong continental influence off the mainland and from the Stikine River. Glacial flour is present in the marine environment in the northern part of this province

nearly year-round. Loess blows out of the Stikine River during the winter and deposits on islands at the mouth of the Stikine.

Biological Features - All forest plant associations except those occurring only on outer coast areas occur in this province. Northern extent of redcedar and salal occurs in this province.

14. North Central Prince of Wales Island Province

Location - This province includes all of Prince of Wales north of a line from Cholmondeley Sound to Hetta Inlet. It also includes the islands of Sukkwan, Tuxekan, and Kosciusko, and numerous smaller adjacent islands.

Physical Features - Topography is relatively gentle, limestone is common, and precipitation is lower due to interception by lands to the south and southwest.

Biological Features - All forest plant associations except those found around the mainland river systems occur in this province. Overall forest productivity, as indicated by the abundance of productive Western Hemlock plant associations, is high. Plant associations with swordfern are typically found on limestone soils. Limestone "sink-holes" and caves are present.

15. Revilla Island/Cleveland Peninsula Province

Location - Encompasses Revillagigedo (Revilla), Annette, Duke, and Gravina Islands and Cleveland Peninsula south and west of Eagle Lake.

Physical Features - Climate is variable with warm and wet conditions predominating on land nearest the outer coast and much colder conditions near the mainland.

Biological Features - The Cleveland Peninsula and Duke Island are nearly in a natural (unaltered by human activities) state, while Revilla, Gravina, and Annette Islands have had human activities and, in specific locations, high human populations. The Cleveland Peninsula has populations of brown bears while the other islands in this province do not. Mountain goats are native to Cleveland Peninsula, have been introduced to Revilla Island, and are absent on the other islands. Revilla Island has more exceptional estuaries, and muskeg ponds are more common on Duke Island, resulting in the presence of wintering trumpeter swans on these two islands. There is some indication that Cleveland Peninsula may have a significant population of goshawks.

16. Southern Outer Islands Province

Location - Encompasses Noyes, Lulu, Baker, San Fernando, Suemez, Heceta, and San Juan Bautista, Coronation, Warren, Maurelle and other small adjacent Islands.

Physical Features - These islands are isolated and are subject to strong oceanic influences. Temperatures are moderate year-round. Topography is low lying and gentle. Snow is rare, or highly transient.

Biological Features - These more isolated islands are relatively rich in vertebrates endemics: dusky shrew (*Sorex obscurus ssp. malitiosus*); long-tailed vole (*Microtus longicaudus ssp. coronarius*); ermine (*Mustela erminea ssp. seclusa*) among others. Major coastal seabird colonies are present.

17. Dall Island and Vicinity Province

Location - Encompasses all of Dall and Long Islands.

Physical Features - These islands are subject to strong oceanic influences. Temperatures are moderate year-round. Snow is rare, or highly transient. Topography is rugged and dissected. Limestone outcrops are abundant. Dall Island appears to be a glacial refugia but inventories of plants and animals are limited.

Biological Features - Subalpine fir, Pacific yew, honeysuckle and many other species at the northern limits of their range occur on Dall Island. Major coastal seabird colonies are present on Dall Island.

18. South Prince of Wales Island Province

Location - This province includes all of Prince of Wales south of a line from Cholmondeley Sound and Hetta Inlet.

Physical Features - Climate is warm and wet. Deep snow is rare, or highly transient. Topography is steep and rugged and the coastline is highly dissected.

Biological Features - Vegetation patterns in this province are largely influenced by southeasterly storm patterns which deposit large amounts of precipitation due to orographic effects. Mixed conifer and western hemlock-redcedar plant associations dominate. Plant associations with salal dominated understories are more common than others. Productive forested plant associations are found on only the very best drained sites on oversteepened slopes and deep surficial deposits of alluvium or colluvium.

19. North Misty Fiords Province

Location - This province encompasses lands on the northern half of Misty Fiords National Monument/Wilderness.

Physical Features - This province has high topographic relief. It has a colder, mainland type climate with many glaciers, as compared to the South Misty Province.

Biological Features - Vegetation occurs in long, narrow strips along the valleys and lower slopes of fiords. Much of the vegetation is muskeg, with cottonwoods in some of the river bottoms. Little of the coniferous vegetation is considered productive forest land. Subalpine fir is extensive along the Canadian border.

20. South Misty Fiords Province

Location - This province encompasses lands on the southern half of Misty Fiords National Monument/Wilderness.

Physical Features - Typical of the other mainland provinces, but the warmest of all the coastal provinces. Maritime influence is greatest along the southern tip of this province. Topographic relief is lower in comparison with the North Misty Province.

Biological Features - Forest plant associations are more diverse in this province than any of the other coastal provinces due to the generally warmer climate and the exposure to the outer coastal storms across Dixon Entrance. Vegetation is less fragmented by rock and ice than in the North Misty Province. More of the coniferous vegetation is considered productive forest land in comparison to the North Misty Province. The southwestern portion of this province is rolling, nearly continuous muskeg with conifer forests in the bottoms and flats. The province is the northern limit of Pacific Silver Fir (*Abies amabilis*), yew (*Taxus brevifolia*), and honeysuckle.

21. Ice Fields Province

Location - Encompasses the ice fields, glaciers, and nunataks along the mainland bordering Canada.

Physical Features - Permanent ice fields, active glaciers (some advancing and some receding), and nunataks dominate this province.

Biological Features - Plant associations consist of "nunatak flora" and early grass, forb, shrub successional plant communities.

Ecological Processes

Ecological processes create the environmental conditions which shape plant and animal communities present in a National Forest. Significant ecological processes on the Tongass National Forest include:

- The amount and pattern of rainfall (Analysis of the Management Situation, Tongass National Forest, 1990, pp. 3-537 - 3-558).
- The effects of glaciation and time of recession of glaciers. The distribution and age of the natural vegetational communities is the result of glacial advances and recession. The distribution of animal species among the islands and the mainland is also attributed to the effect of glaciers (Klein, 1965).
- The lack of natural fire. Fire has not been a major factor in shaping the vegetative conditions on the Tongass (Analysis of the Management Situation, Tongass National Forest, 1990, pp. 3-67 - 3-73).
- The influence of wind. Wind has been a widespread natural disturbance factor, shaping forested vegetation on the Tongass. Wind effects can be placed in two categories: 1) wind is a constant "small scale" disturbance force throughout most of the Forest, wherein individual trees or small groups of trees are blown over, which creates small openings in forest stands; 2) wind is a "large scale" disturbance force at specific times and places, wherein large blocks of trees (hundreds of acres in size) can be blown down in violent localized wind storms.
- Physical characteristics of Southeast Alaska. These combine with ecological processes to create unique environments. These include steepness of slopes, presence of high water tables, soil types and conditions, and elevations.

These ecological processes are not independent processes, but rather combine to create the environmental conditions which are the Tongass National Forest. The discussions on the physical and biological setting at the beginning of this chapter help illustrate these conditions.

Most of the forest area on the Tongass National Forest is old growth, particularly on islands which were uncovered before the mainland during the most recent glacial recession. These islands provide important habitat for plants and animals, yet rarely in any archipelago are populations of all species found on all islands. Biogeographic factors, including island size and distance to other islands and the mainland, influence the ability of a species to successfully colonize islands (MacArthur and Wilson, 1967). Factors associated with behavior and ecological relationships are also thought to influence distribution of animal species. Examples of this are Admiralty, Baranof, and Chichagof Islands which support brown bear but not black bear (*Ursus americanus*) populations. Some islands have populations of gray wolves, while others do not, and their presence has an important influence on the distribution and abundance of other species such as Sitka black-tailed deer, *Odocoileus hemionus sitkensis* (Van Ballenberghe and Hanley, 1984).

Plant Associations and Vegetative Conditions

The types of plant communities and plant associations present in an area are the result of the ecological processes. The ecological processes in place in Southeast Alaska have created conifer forests which are ecologically unique in North America. These forests have been classified into one ecological type, seven series, and 57 plant associations (Martin, 1989). Plant associations have been developed only for the conifer forests on the Tongass National Forest and not for other vegetational communities such as cottonwood, muskegs, and shrubs. At the present time, it is not possible to display the total acres of each of the Forest's plant

associations because necessary resource inventory work is not complete. The Forest is currently working on approaches to develop quantitative displays for the plant associations.

Table 3-2 displays vegetative conditions on the Tongass National Forest for each of the ecological provinces. These vegetative conditions are from the timber type maps, digitized in the Revision data base, as the best available Forest-wide vegetation data source. Productive conifer old growth includes those areas with spruce, hemlock, and cedar stands greater than 150 years old and containing at least 8,000 board feet/acre. A more detailed discussion can be found in the Old-Growth section of this chapter.

In 1954, about 5,410,000 acres of productive old growth existed Forest-wide. Since then, timber harvesting has occurred on about 360,000 acres, reducing the amount of productive old growth since 1954 by about 6.7 percent.

Table 3-3 displays the percentage of productive old growth that has been harvested over the last 36 years (1954-1990).

Table 3-3

Percent of productive old growth harvested between 1954 and 1990 within 21 Ecological Provinces

Province	Percent of Old Growth Harvested	Province	Percent of Old Growth Harvested	Province	Percent of Old Growth Harvested
1	6.6	8	2.6	15	4.6
2	0.0	9	0.0	16	10.8
3	7.9	10	8.2	17	0.6
4	0.0	11	6.2	18	1.6
5	9.7	12	2.1	19	0.4
6	6.9	13	10.6	20	0.0
7	0.0	14	22.6	21	4.4

Table 3-2

Acres of various vegetative conditions on the Tongass National Forest in 1990 within 21 Ecological Provinces

Ecological Province[1]:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Productive Conifer Old Growth																					
Strata A	12,317	12,849	219,723	49,788	58,336	152,078	243,269	84,718	159,978	183,583	102,758	127,224	130,289	208,083	221,939	56,957	27,552	70,850	119,962	200,773	76,404
Strata B	10,860	9,868	154,055	17,525	34,747	60,018	245,348	56,384	138,950	110,058	157,389	96,408	85,153	213,364	267,613	45,602	29,078	48,002	64,347	96,887	32,779
Strata C	22,895	2,020	34,036	2,159	2,204	4,186	90,981	11,575	22,602	18,385	31,373	17,934	12,020	93,072	32,368	11,279	6,747	25,227	10,677	11,365	5,099
Strata D	3,065	0	720	0	0	60	7,195	240	415	1,420	5,802	481	661	33,071	1,780	2,124	1,576	23,754	3,219	2,640	520
Unprod. Conifer O.G.[2]	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810	91,402	159,276	187,590	414,436	460,297	70,764	29,898	153,917	244,428	326,556	143,241
Productive Conifer Young Growth[3]																					
Seeds/Saps/CNS	8,357	2,315	32,982	80	5,144	7,972	540	3,200	220	28,844	20,428	2,660	27,713	108,472	13,866	11,166	0	2,604	1,261	100	3,191
Pole Timber	18,742	3,623	8,956	100	8,203	12,164	6,474	4,098	3,531	7,789	4,761	5,139	5,105	67,984	16,945	5,396	719	940	5,501	1,480	5,751
Young Saw Timber	62,411	28,200	5,815	580	421	1,462	10,812	5,259	7,261	1,262	3,138	2,061	4,841	4,360	2,003	2,376	579	639	1,340	960	2,399
Unproductive Conifer Y.G.[4]	20,879	11,053	119,782	11,581	29,220	54,042	52,739	24,359	41,128	67,684	43,415	22,852	16,687	8,002	19,589	953	1,078	5,583	44,611	44,786	41,714
Black Cottonwood	20	40	0	0	0	0	0	2,282	3,865	0	0	1,581	0	0	0	0	0	0	280	0	500
Red Alder	0	0	0	0	0	0	40	0	0	40	0	20	712	0	0	0	0	0	0	0	20
Other Alder, Other Brush, Willow	14,386	97,482	43,325	6,085	19,717	52,948	17,689	76,690	144,989	2,719	2,639	53,416	2,440	3,445	17,636	398	2,528	4,201	112,315	71,239	201,214
Natural Grassland	2,015	142	4,100	180	1,021	1,022	940	5,242	4,789	1,538	1,098	9,711	260	2,258	840	120	100	420	2,619	1,140	1,924
Muskeg Meadow	72,559	1,612	43,667	13,561	1,481	22,740	5,917	1,339	4,296	42,733	1,379	3,843	2,196	22,504	9,950	1,675	1,737	519	1,280	1,601	1,359
Slide Zone	240	11,906	59,643	12,025	25,084	23,463	60,283	24,064	39,784	4,580	4,274	25,191	2,181	6,203	3,782	298	319	4,683	22,783	14,566	34,025
Freshwater (Lakes, Ponds)	8,234	17,382	6,360	7,387	6,615	22,808	11,437	11,166	21,890	4,001	2,441	16,982	4,820	23,971	33,393	860	1,399	10,728	18,531	14,559	16,826
Alpine Meadow	20	3,125	82,006	18,506	21,422	53,311	37,505	44,901	20,076	3,763	3,649	23,408	7,804	13,814	37,453	2,579	2,715	2,040	67,091	49,511	41,407
Ice/Snowfield (Glaciers)	140	190,811	600	200	16,136	4,840	1,580	46,613	60,268	0	80	21,725	0	0	400	0	0	0	40,980	10,324	1,369,980
Rock	2,541	143,814	84,234	34,492	88,775	102,660	28,518	136,291	198,838	540	6,127	128,545	6,783	14,691	24,821	799	3,235	14,771	204,328	50,793	751,370
Other Non-forested[5]	11,279	6,428	3,280	4,745	1,139	2,792	3,957	3,942	2,953	2,699	1,341	2,442	2,484	21,024	3,762	499	519	1,178	4,600	4,803	4,238
Other Unclassified Acres[6]	541	368,142	340	20	60	240	699	1,079	1,503	199	160	259	160	1,798	1,120	121	119	540	1,260	220	274,634
Total Acres	**307,427**	**918,743**	**1,057,583**	**280,485**	**391,980**	**772,623**	**1,045,114**	**644,317**	**1,012,506**	**760,648**	**483,651**	**721,158**	**500,119**	**1,260,553**	**1,169,559**	**213,964**	**109,899**	**370,594**	**971,413**	**904,304**	**3,008,595**

Source: Revision data base, Q200E, April 1991.

[1] Numbers for Ecological Provinces correspond to Figure 3-xxx.

[2] Unproductive Conifer Old Growth. Descriptions of the old-growth forest types are provided in the chapter on old-growth forests.

[3] Descriptions of productive young growth are as follows: seedlings or saplings are conifer trees under 5 inches dbh; cns are currently non-stocked lands; pole timber are conifer trees 5 to 9 inches dbh; young-growth sawtimber are conifer trees over 9 inches dbh but less than 150 years.

[4] Unproductive Conifer Young Growth. Unproductive young growth are conifer stands with low productivity due to alder, glaciers, slide zones, and willow.

[5] Other non-forested conditions includes such things as sand dunes, river fill, uplifted beach, mass wasting.

[6] Other unclassified acres are all lands which have not had vegetation typing completed.

Number of Animal and Plant Species

This element of biological diversity is an accounting of all plant and animal species known to occur on the Tongass National Forest. The Tongass National Forest provides habitat for 72 species of mammals, 231 species of birds, and five species of amphibians and reptiles (Taylor, 1979). Additionally, there are 18 species of marine mammals found in Southeast Alaska which depend entirely on the marine environment, 45 species of birds which are considered casual or accidental visitors to Southeast Alaska, and three species of amphibians and reptiles which are considered casual or accidental visitors to Southeast Alaska (Taylor, 1979). The Wildlife section of this chapter provides information on those animal species.

Thirty-seven freshwater and anadromous fish species are found in the fresh waters of Southeast Alaska (Taylor, 1979). Eight of these are primarily marine species, ten species are uncommon freshwater, and 19 are common freshwater or anadromous species. Thirty-six species of marine invertebrates (species without vertebrae, such as clams and crabs) are commonly found in the near-freshwater environment (Taylor, 1979). The Fish section of this chapter presents additional information on the fish species on the Tongass National Forest.

Approximately 1,000 vascular plant species occur in Southeast Alaska, with 151 of these species being introduced since Russian contact (Muller, 1983). These species can be grouped into five life forms: 1) Pteridophytes - which includes species of ferns, horsetails, club mosses and quillworts; 2) Graminoids - which includes species of grasses, sedges and rushes; 3) Forbs - includes plant species which die back each year and are not woody; 4) Shrubs - low woody perennial plants (usually under 10 feet) frequently with multiple stems; 5) Trees - tall woody plants (usually over 10 feet), generally with one main trunk. Table 3-4 summarizes the number of vascular plant species present in Southeast Alaska by each of the life forms.

Table 3-4
Number of vascular plant species in Southeast Alaska by lifeform group

	Pteridophytes	Graminoids	Forb	Shrubs	Trees
Native Species	52	186	510	93	21
Introduced Species	0	31	116	2	2

Source: Muller, M. 1983. A Preliminary Check list of the Vascular Plants in Southeastern Alaska. USDA Forest Service, Admin. Doc. Number 112.

With our current state of knowledge, four plant species have been identified as possible endemics to Southeast Alaska. (In this instance, endemics are plants only found in Southeast Alaska and no other place in the world.) All four species have questionable taxonomic status, and further field study and investigation are necessary to establish the validity of these species. A summary of these four species follows:

Castilleja chrymactis: Beach meadows habitat; possible endemic to northern Southeast Alaska; taxonomic questions need to be resolved.

Habenaria gracilis: Wet meadows habitat; known only from extreme southern Southeast Alaska and adjacent British Columbia; some authors place this species with *H. saccata*; taxonomic questions need to be resolved.

Poa merrilliana: Known only from Hubbard Glacier area; probably should be placed with *P. leptocoma*; further field and taxonomic study necessary to determine status.

Poa norbergii: Known only from Hoonah area; probably should be placed with *P. macrocalyx*; further field and taxonomic study necessary to determine status.

Species Extinctions & Introductions

The great auk (a flightless bird) and the Steller's sea cows are extinct on the Tongass National Forest due to overharvest during Russian ownership of Southeast Alaska in the mid-1800's (Ray, 1988). Marten, red squirrel, and mountain goat were introduced on many of the islands; previously they existed only on the mainland (Burris and McKnight, 1973). Elk, which are not native to Southeast Alaska, have recently been introduced on Etolin Island; a small number of elk have naturally dispersed from Etolin Island to Zarembo Island. The Wildlife section contains additional information on the current distribution of marten, red squirrel, and mountain goat.

Brook trout and arctic grayling, which are not native to Southeast Alaska, have been introduced into several lakes and streams. Stocking of many lakes in Southeast Alaska with brook trout occurred from about 1916 until the late 1950's. Most of these stockings failed. Presently, 17 lakes throughout Southeast Alaska are known to contain brook trout (Schwan, et al., 1984). Arctic grayling were stocked in lakes commencing in 1950 and continuing after statehood. The success of these stockings has varied from complete failure to excellent. Currently, 17 lakes are known to contain reproducing populations of grayling (Schwan, et al., 1984).

Some fish stocking efforts have used fish from areas outside of Southeast Alaska, and although new species have not been introduced, new genetic fish stocks have.

Species Abundance & Distribution

The National Forest Management Act provides direction to maintain viable populations of vertebrates that are well distributed throughout the planning area (USDA Forest Service, 1982). To accomplish this direction, historical and current distributions and abundance of species must be understood and discussed. Discussion of all 356 animal and 1,000 plant species found on the Tongass National Forest is not possible nor are data available to discuss each species. Rather, the emphasis is placed on those species identified by the public or within the agency as being of special concern. Such species include endemics, threatened, endangered and sensitive species, and species receiving emphasis for management.

Management Indicator Species

Population changes of Management Indicator Species (MIS) are believed to reflect the effects of land management activities. Evaluation of all species occurring within a planning area can be reduced through this concept to a number that promotes meaningful evaluation. The evaluation of the effects of management practices on MIS and their habitats provides an additional basis for ensuring the maintenance of biological diversity.

Eight mammals, five birds, and three fish species were selected as Management Indicator Species for the Tongass National Forest from 29 proposed species (Sidle and Suring, 1986). Information on the habitat relationships of MIS is incorporated in forest planning through the application of habitat suitability and habitat capability models. Such models are used to project the response of MIS to changes in habitat quality and diversity. The Fish and Wildlife sections of this chapter discuss the habitat relationships of the MIS and the development of habitat suitability and habitat capability models.

Habitat Fragmentation

Fragmentation is an element of biological diversity that describes the natural condition of habitats in terms of old-growth patch size and distribution, and the effects of management on this patch size and distribution. Discussions of fragmentation illustrate the effect of management activities on the quantity, size and distribution of habitats. Emphasis is placed on

the Management Indicator Species, threatened, endangered and sensitive species, and endemic and other species' habitats identified by the public or interagency committees.

Three concepts were developed which describe how species generally use or respond to their environment with regard to habitat fragmentation such as minimum old-growth patch size and or corridors. The amount of contiguous habitat, and the extent to which similar habitats connect by corridors, are currently considered key concepts in managing for biological diversity.

Landscape Concept. Wildlife species included under this concept generally have large seasonal or year-long home ranges and territories. These species are capable of using a wide variety of vegetative conditions, although preferences for certain vegetation types exist which provide a higher quantity or quality of forage or cover needs. Usually there is not just one critical or limiting season which has been identified for the species. Species will travel or move through a wide variety of habitats to use their environment, therefore, specific corridor requirements are not needed. These species do not have a minimum old-growth patch size requirement to use a particular habitat. Managing or maintaining preferred or higher quality vegetation types will result in higher populations than managing or maintaining less preferred or lower quality vegetation types. Managing to minimize "population sinks" will increase habitat effectiveness and is an important management priority. "Population sinks" are factors such as roads and human disturbance which directly affect a population either through displacement of individuals from preferred habitats or through mortality (Knight , et al., 1988).

Community Concept. Wildlife species generally have smaller home ranges and territories than in the landscape concept. Sometimes a particular season of the year is considered a critical or limiting season which greatly influences the overall population of a species. These species show a high preference or requirement for a particular vegetative community or combination of communities, especially during the season of the year which is considered critical. Preferred or required habitats may need to be within the mean dispersal distance of the species and corridors may be needed. These species generally show a relationship with patch size of the preferred or required habitats. In some situations, as patch sizes are reduced, a species may be displaced by another species which can more effectively use the habitat. Management concerns for these species include maintaining proper dispersal of habitats and effective corridors between habitats, where required.

Structural Concept. Wildlife species in this category require a specific or unique habitat element or site for their presence, such as a pond or cliff for nesting. Often, the size, location, and abundance of these sites are the result of natural geologic or climatic events rather than the effects of management. Management concerns for these species include: 1) maintaining the integrity of the site; 2) preventing human disturbances which would cause the species to abandon the site; and 3) understanding and managing for natural disturbances (such as blowdown) which can affect the site.

Each of the MIS and threatened, endangered, candidate (Category 2), and sensitive species (except fish and marine mammals) selected for the Tongass National Forest was placed within one of the above concepts (Table 3-5). For the species within the landscape and structural concepts, the habitat capability models and or management direction indicate habitat relationships and management opportunities. Specific patch size relationships and corridors are not applicable to these species. Species within the community concept are thought to be sensitive to minimum-sized patches of habitat and, in most cases, corridors. As old-growth patch size decreases, the value of the habitat decreases. When patches fall below the minimum size, they no longer provide habitat for the species. Guidelines for corridors include definition of plant communities' suitability to serve as corridors for each species. The sections titled

Wildlife and Threatened, Endangered and Sensitive Species explain the old-growth patch sizes and corridor requirements for each of these species.

Habitat fragmentation due to management activities is a concern primarily associated with timber harvesting. Techniques to measure and display habitat fragmentation have not been developed for the Forest-wide GIS data base. However, it is possible to identify which areas of the Forest have had timber management and potential effects of habitat fragmentation from this management activity. Most of the timber harvesting which has occurred on the Forest is associated with the areas classified as roaded. The roadless areas of the Forest will be in natural habitat conditions, unmodified by timber harvesting.

Table 3-5

Management Indicator Species, Endangered, Threatened, Candidate and Sensitive Species on the Tongass National Forest, by landscape, community and structural concepts

Concept	Species
Landscape	Brown bear
	Black bear
	Gray wolf
	River otter
	Mountain goat
	North American lynx
Community	Marten
	Red squirrel
	Red-breasted sapsucker
	Hairy woodpecker
	Brown creeper
	Marbled murrelet
	Vancouver Canada goose
	Glacier Bay water shrew
	Sitka black-tailed deer
Structural	Bald eagle
	Trumpeter swan
	Peregrine falcon
	Osprey

Species Vulnerability

The emphasis in this element is to identify plant and animal species or other unique genetic stocks that may be impacted by environmental events or human activities. These species include threatened and endangered species listed under authority of the Endangered Species Act of 1973, as amended, by the U.S. Fish and Wildlife Service or National Marine Fisheries Service. These species also include those which are identified by State endangered species laws, or species which are identified by the Regional Forester as sensitive species.

There are eight species of whales, the Steller (Northern) sea lion, and two subspecies of peregrine falcon that are currently listed as Threatened or Endangered under authority of the Endangered Species Act. Three species of plants and three animal species are currently "Category 2 Candidate" species, which means they are being considered for listing as

threatened or endangered. Four plant species and three animal species are currently "Category 3b or 3c Candidate" species, which means they are either taxonomically invalid or more abundant, widespread and less subject to identifiable threats than previously thought. Three birds and three fish have been designated by the Regional Forester as sensitive species on the Tongass National Forest. The "Threatened, Endangered, Candidate and Sensitive Species" section of this chapter discusses these species.

The Forest Service initiated a Challenge Cost-Share Agreement with the Nature Conservancy to review information on the distribution and abundance of plants in the Alaska Region. As a result of this Challenge Cost-Share Agreement, the Nature Conservancy provided the Forest Service with a report dated January 1, 1991, titled: *Rare Vascular Plant Species of the U. S. Forest Service Alaska Region - Including Sensitive Species Recommendations.*

In addition, the Forest Service is participating in the Nature Conservancy's Natural Heritage Data Base. Information from this data base are available to participating state and federal agencies and provide immediate access to the most recent information on species distribution and abundance.

The Forest Service also participates in an interagency wildlife technical committee which is currently reviewing species for sensitive status consideration. Agencies making up the wildlife technical committee include the Forest Service, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, National Marine Fisheries Service and The Nature Conservancy.

Table 3-6 lists species currently currently being considered for sensitive status.

Table 3-6
Species currently being considered for Sensitive Status

Plant Species	Vertebrate Species
Poa merrilliana	*Accipiter gentilis laingi* (Northern Goshawk)
Poa norbergii	
Arnica lessingii ssp. norbergii	
Castilleja chrymactis	
Rhinanthus arcticus	
Atriplex drymarioides	
Carex lenticularis var. dolia	
Dodecatheon pulchellum ssp. alaskanum	
Draba borealis var. maxima	
Platanthera chorisiana	
Platanthera gracilis	
Puccinellia hultenii	
Puccinellia kamischatica	
Ranunculus orthorhynchus var. alaschensis	
Romanzoffia unalaschcensis	
Senecio moresbiensis	
Stellaria ruscifolia ssp. aleutica	
Cirsium edule	
Glyceria leptostachya	
Hymenophyllum wrightii	
Ligusticum calderi	
Poa laxiflora	
Taxus brevifolia	

Sources: Alaska Natural Heritage Program/The Nature Conservancy, 1991, Rare Vascular Plant Species of the U. S. Forest Service Alaska Region - Including Sensitive Species Recommendations; ADF&G letter of March 9, 1990; Wildlife Technical Committee Meeting of March 20, 1991.

Biological Diversity

Environmental Consequences

This section focuses on how biological diversity would change over time with the five different alternative scenarios. Where information is presented in other sections of the Supplement which relate to biological diversity, a reference will be made to refer to that section for more detailed information.

Direct, Indirect and Cumulative Effects

Ecological Processes

Some natural ecological processes can be altered by resource management activities. In particular, timber harvesting, mining and associated road development activities alter ecological processes more than non-market oriented resource activities such as hiking or wildlife viewing. Tables 3-8 through 3-15 display 24 different biological diversity elements, showing for most elements how they've changed since 1954 to the present and how they would likely change under each of the five alternatives over the next 150 years.

Alternatives A, B, C, D and P have 81 percent, 77 percent, 66 percent, 68 percent, and 69 percent, respectively, of the total Forest acreage within Wilderness, legislated LUD II, and other Wilderness and Natural Setting land use designations that will provide a nearly-controlled environment within which natural processes will continue to occur.

Plant Associations

Since detailed mapping, particularly of soils information, in Wilderness areas (34 percent of the total National Forest acreage) has not been accomplished to date, it is not possible to accurately calculate and analyze the acres of each of the Forest's 57 plant associations. However, information on productive old growth and unproductive old growth is displayed in Tables 3-8 through 3-15, showing how each category of old growth has changed since 1954, and how it would likely change under each of the five alternatives over the next 150 years.

In 1954, unproductive old growth Forest-wide totaled about 3,430,000 acres. It has not measurably changed since 1954 and is not expected to measurably change over the next 150 years under any of the five alternative scenarios.

Under Alternative A, B, C, D and P, compared to 1954, productive old growth would continue to decline over the next 150 years by about 18 percent, 22 percent, 24 percent, 24 percent, and 23 percent respectively. These existing acres of old growth would be replaced by young, growing stands of primarily even-aged vegetation.

There are about 954,000 acres of riparian areas Forest-wide. In 1954, about 460,000 riparian acres were in productive old growth conditions. Since 1954, about 46,000 acres (six percent) have been altered due to timber development activities. No net measurable change in diversity on riparian areas is anticipated under Alternatives A, B, C and P. No serious and adverse effect on riparian areas is anticipated under Alternative D.

More detailed information can be found in the Old Growth, Soils, and Water sections of this chapter.

Number of Animal and Plant Species and Introductions

All alternatives are expected to maintain viable populations of all plant and animal species. There are no plans for introductions of new species. In 1987, elk were introduced into

Southeast Alaska on Etolin Island. A few of these elk have naturally dispersed from Etolin Island to Zarembo Island. Management agencies are currently evaluating future management options for elk in Southeast Alaska. Fish enhancement projects include stocking of native species of fish into barren lakes.

There are no threatened or endangered species on the uplands of the Tongass National Forest. Sensitive species have specific standards and guidelines to ensure maintenance of habitats so no adverse effect is anticipated. More detailed information can be found in the Threatened, Endangered and Sensitive Species and Wildlife sections of this chapter.

Management Indicator Species (MIS)

There are 13 wildlife and 3 fish indicator species on the Tongass. No net measurable loss of fish habitat is anticipated under any Alternative. Under all alternatives, a measurable increase in fish habitat capability and production is anticipated in the coming decades because of a vigorous fish enhancement program to make potential habitat available to anadromous fish species. See the Fish section of this chapter for more detailed information.

Wildlife habitat capability by management indicator species Forest-wide for 1954 and 1990, and an estimate of how capability would change over the next 150 years by alternative, is shown in Tables 3-8 through 3-15. Since essentially all of the wildlife management indicator species are associated with old-growth forests, a decline since 1954 to the present, and further declines in habitat capability over the next 150 years in all alternatives, is anticipated. A decline in habitat capability does not necessarily correlate to a population trend. For example, nesting habitat capability 150 years from now under all alternatives would support the current eagle population.

Habitat Fragmentation

The alteration of natural contiguous old-growth patch sizes will occur under all alternatives in land use designations that allow timber harvesting. Natural contiguous old-growth patch sizes would be maintained in those areas allocated to Natural Setting and Wilderness land use designations.

The acres of productive old growth within land use designations that allow consideration of timber harvest would have fragmentation occur over time, although there are many different patterns and options for laying out timber harvest units. Forest-wide Standards & Guidelines direct project level analysis to use the old-growth patch size relationships for the management indicator species to minimize fragmentation to the extent possible. Table 3-7 shows the percent of productive old growth by ecological province that would likely be harvested after 150 years under a maximum potential effects scenario.

Table 3-7

Percent of productive old growth harvested after 150 years under a maximum potential effects scenario within 21 Ecological Provinces

Province	Percent of Old Growth Harvested	Province	Percent of Old Growth Harvested	Province	Percent of Old Growth Harvested
1	57.4	8	20.8	15	39.2
2	0	9	17.8	16	41.7
3	38.7	10	54.5	17	58.1
4	0	11	46.3	18	67.7
5	29.0	12	30.8	19	3.6
6	12.0	13	57.7	20	0
7	4.0	14	70.0	21	10.0

At most, about 1.8 million acres (36 percent) of currently productive old growth would change over time. Up to an average of 18,800 acres per year would be changed from old-growth forest to young growth. Assuming these acres would continue to be managed primarily for timber production would mean they would likely be harvested again before reaching an old-growth condition.

Beach Fringe, Wild, Scenic, and Recreation Rivers, Research Natural Areas, Special Interest Areas, 100-foot no commercial timber harvest buffers on all Class I streams and all Class II streams that flow directly into Class I streams, over 3.4 million acres of unproductive old growth, and a minimum of 3.06 million acres of productive old growth in Natural Setting land use designations, serve to provide a mosaic of vegetative patterns and wildlife travel corridors across the Forest.

Species Vulnerability

Species considered vulnerable include threatened and endangered species listed under authority of the Endangered Species Act of 1973, as amended, by the U.S. Fish and Wildlife Service or National Marine Fisheries Service, species identified by State endangered species laws, and species which are identified by the Regional Forester as sensitive species.

No threatened or endangered species occur on the uplands of the Tongass National Forest. Specific standards and guidelines are provided for all Threatened, Endangered, Candidate and Sensitive Species that are known to occur within the planning area, to ensure habitat maintenance. See the Threatened, Endangered, Candidate and Sensitive Species section of this chapter for more information and the Proposed Revised Forest Plan for specific standards and guidelines.

Table 3-8

Forest-wide summary of biological diversity elements, for 1954, 1990, and decade 15 for each alternative

Biological Diversity Elements	1954	1990	Alt. A	Alt. B	Alt. C	Alt. D	Alt. P
Total National Forest Acres	16,905,235	16,905,235	16,905,235	16,905,235	16,905,235	16,905,235	16,905,235
Wilderness/Monument Acres	0	5,904,383	5,904,383	5,904,383	5,904,383	5,904,383	5,904,383
Natural Setting Acres	16,905,235	5,225,584	7,749,345	7,034,562	5,225,591	5,511,060	5,751,976
Research Natural Areas (Number)	3	6	23	22	19	19	22
Special Interest Areas (Number)	3	9	30	30	9	11	30
Productive Old Growth (Acres)	5,408,657	5,050,762	4,170,676	4,012,764	3,666,038	3,594,729	3,780,431
Unproductive Old Growth (Acres)	3,429,904	3,429,904	3,429,904	3,429,904	3,429,904	3,429,904	3,429,904
Landscape Linkages							
Streams w/ 100 ft. buffers (Acres)	Unknown	397,123	397,123	397,123	397,123	397,123	397,123
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	581,121	637,522	641,841	1,241,392	637,520	370,660	638,182
Wild/Scenic/Recreation Rivers (Acres)	0	0	333,679	200,449	0	52,205	100,509
Riparian: Total Acres	954,000	954,000	954,000	954,000	954,000	954,000	954,000
Riparian: Productive Old Growth Acres	460,000	414,000	396,000	391,000	387,000	387,000	387,000
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability							
Sitka Black-tailed Deer	283,564	263,385	215,049	207,742	185,556	179,065	193,155
Mountain Goat	8,532	8,532	8,492	8,483	8,410	8,441	8,427
Brown Bear	6,276	6,174	5,937	5,871	5,707	5,684	5,716
Black Bear	14,477	14,192	12,342	12,032	11,254	11,216	11,476
Gray Wolf	839	775	641	590	566	551	588
Marten	17,079	16,055	13,639	13,165	11,915	11,691	12,209
Red Squirrel	6,690,531	6,581,507	5,970,377	5,820,157	5,499,191	5,422,863	5,515,310
River Otter	7,703	7,175	7,114	7,100	7,059	5,622	7,062
Bald Eagle	18,986	17,460	17,323	17,290	17,191	12,143	17,196
Hairy Woodpecker	118,058	100,427	81,098	77,360	67,467	65,449	68,628
Red-breasted Sapsucker	976,789	933,774	783,161	752,495	674,313	660,602	685,500
Brown Creeper	141,517	88,551	69,060	65,250	55,624	54,042	56,754
Vancouver Canada Goose	20,696	18,724	16,999	16,304	14,847	14,628	15,191

Table 3-9

1954: Status of biological diversity elements within 21 Ecological Provinces

Biological Diversity Element	1	2	3	4	5	6	7	8	9	10
					Ecological Province					
Total National Forest Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,648
Wilderness/Monument Acres	0	0	0	0	0	0	0	0	0	0
Natural Setting Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,468
Research Natural Areas (Number)	0	0	0	0	0	0	1	0	1	0
Special Interest Areas (Number)	0	0	0	0	0	0	0	0	2	0
Productive Old Growth (Acres)	52,617	24,817	443,446	69,472	105,852	232,437	586,793	156,995	321,965	341,378
Unproductive Old Growth (Acres)	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810
Landscape Linkages										
Streams w/ 100 ft. buffers (Acres)	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	9,946	6,192	33,601	23,716	17,654	52,445	42,606	11,659	29,430	26,960
Wild/Scenic/Recreation Rivers (Acres)	0	0	0	0	0	0	0	0	0	0
Riparian Areas (954,000 acres) (460,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability										
Sitka Black-tailed Deer	0	0	25,640	7,401	5,915	18,679	31,953	1,281	2,391	19,239
Mountain Goat	3	95	0	0	299	392	0	448	808	0
Brown Bear	83	132	1,364	304	410	875	1,423	177	193	0
Black Bear	242	150	0	0	0	0	6	639	1,130	1,283
Wolf	11	3	0	0	0	0	0	14	21	80
Marten	287	114	1,407	302	362	837	1,661	457	803	1,274
Red Squirrel	291,469	161,938	685,997	158,684	193,214	406,438	687,292	264,866	462,412	494,008
River Otter	132	20	837	125	229	533	449	238	431	525
Bald Eagle	279	27	2,264	336	669	1,466	1,170	524	1,044	1,202
Hairy Woodpecker	1,876	552	9,758	1,094	2,081	4,086	12,747	3,056	5,857	6,938
Red-breasted Sapsucker	9,144	5,074	82,765	15,894	20,719	47,795	97,532	30,214	55,422	65,899
Brown Creeper	4,365	464	11,111	406	2,060	3,286	14,840	2,551	3,908	7,545
Vancouver Canada Goose	45	8	1,818	81	361	776	246	569	1,115	2,939

Table 3-9 (continued)

Biological Diversity Element	Ecological Province 11	12	13	14	15	16	17	18	19	20	21
Total National Forest Acres	483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595
Wilderness/Monument Acres	0	0	0	0	0	0	0	0	0	0	0
Natural Setting Acres	483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595
Research Natural Areas (Number)	0	0	0	1	0	0	0	0	0	0	0
Special Interest Areas (Number)	0	0	0	0	1	0	0	0	0	0	0
Productive Old Growth (Acres)	317,152	247,243	255,118	707,754	548,889	130,061	65,313	170,570	199,065	311,665	120,055
Unproductive Old Growth (Acres)	91,402	159,276	187,590	414,436	460,297	70,764	29,898	2,604	244,428	326,556	143,241
Landscape Linkages											
Streams w/ 100 ft. buffers (Acres)	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	26,960	41,113	16,796	34,531	62,925	51,716	25,821	14,052	34,214	13,945	31,799
Wild/Scenic/Recreation Rivers (Acres)	0	0	0	0	0	0	0	0	0	0	0
Riparian Areas (954,000 acres) (460,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability											
Sitka Black-tailed Deer	22,928	8,227	15,236	53,584	26,106	13,955	6,416	15,526	1,575	7,143	369
Mountain Goad	0	558	0	0	466	0	0	0	1,572	968	2,923
Brown Bear	0	197	97	0	158	0	0	0	281	334	248
Black Bear	887	888	865	2,174	1,856	384	186	611	1,056	1,349	771
Wolf	94	43	61	199	118	47	23	56	19	39	11
Marten	1,120	698	516	2,495	1,693	465	222	647	516	949	254
Red Squirrel	371,744	343,859	333,755	0	768,340	0	0	0	327,095	452,828	284,592
River Otter	632	309	388	960	670	260	125	345	155	263	77
Bald Eagle	1,685	820	996	2,193	1,427	578	332	770	381	676	147
Hairy Woodpecker	8,132	4,721	5,237	21,486	11,505	3,174	1,514	4,403	3,252	4,893	1,696
Red-breasted Sapsucker	55,857	44,276	46,066	116,662	98,055	24,004	12,005	31,100	36,639	61,038	20,719
Brown Creeper	8,875	3,927	6,111	43,030	9,343	4,270	1,423	7,513	2,627	2,434	1,428
Vancouver Canada Goose	1,706	1,081	1,830	3,457	2,481	557	187	709	303	0	427

Table 3-10

1990: Status of biological diversity elements within 21 Ecological Provinces

Biological Diversity Element	Ecological Province 1	2	3	4	5	6	7	8	9	10
Total National Forest Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,648
Wilderness/Monument Acres	5,713	343,001	61,881	230,343	90,497	224,274	976,235	97,409	251,231	47,635
Natural Setting Acres	247,087	574,140	437,769	24,809	122,281	212,962	6,346	301,074	325,371	71,842
Research Natural Areas (Number)	0	0	0	0	0	0	1	0	2	0
Special Interest Areas (Number)	0	1	0	0	0	0	1	0	4	0
Productive Old Growth (Acres)	49,137	24,737	408,484	69,472	95,287	216,342	586,793	152,917	321,945	313,446
Unproductive Old Growth (Acres)	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810
Landscape Linkages										
Streams w/ 100 ft. buffers (Acres)	22,087	2,274	42,707	3,981	9,688	23,681	26,372	16,087	22,832	38,291
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	9,946	6,193	32,922	23,636	17,394	51,863	42,506	11,439	28,910	25,981
Wild/Scenic/Recreation Rivers (Acres)	0	0	0	0	0	0	0	0	0	0
Riparian Areas (954,000 acres) (414,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability										
Sitka Black-tailed Deer	0	0	23,199	7,401	5,067	17,526	31,953	1,274	2,390	17,668
Mountain Goat	3	95	0	0	299	392	0	448	808	0
Brown Bear	82	132	1,318	304	390	850	1,423	175	193	0
Black Bear	241	150	0	0	0	0	0	634	1,130	1,263
Wolf	11	3	0	0	0	0	0	14	21	75
Marten	279	112	1,299	302	326	786	1,661	444	803	1,192
Red Squirrel	289,786	161,478	664,977	158,684	186,847	396,770	687,292	262,487	462,400	476,692
River Otter	132	20	724	125	189	489	449	222	431	496
Bald Eagle	278	27	1,966	336	533	1,324	1,170	482	1,044	1,116
Hairy Woodpecker	1,736	514	8,012	1,094	1,553	3,290	12,747	2,858	5,856	5,564
Red-breasted Sapsucker	8,796	4,981	78,360	15,894	19,416	45,881	97,532	29,714	55,420	62,714
Brown Creeper	3,945	349	5,867	406	475	899	14,840	1,957	3,905	3,393
Vancouver Canada Goose	45	8	1,735	81	337	738	246	560	115	2,841

Table 3-10 (continued)

Biological Diversity Element	11	12	13	14	15	16	17	18	19	20	21
	Ecological Province										
Total National Forest Acres	483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595
Wilderness/Monument Acres	127,020	278,170	82,122	39,868	240,118	33,597	0	85,431	794,936	904,304	990,598
Natural Setting Acres	90,812	183,225	31,106	161,750	349,878	104,602	25,958	79,878	91,192	0	1,783,502
Research Natural Areas (Number)	0	0	0	1	1	0	0	0	0	1	0
Special Interest Areas (Number)	0	0	0	0	1	0	0	0	0	2	0
Productive Old Growth (Acres)	297,322	242,047	228,123	547,590	523,700	115,962	64,953	167,833	198,205	311,665	114,802
Unproductive Old Growth (Acres)	91,402	159,276	187,590	414,436	460,297	70,764	29,898	2,604	244,428	326,556	143,241
Landscape Linkages											
Streams w/ 100 ft. buffers (Acres)	19,964	20,030	14,470	56,747	32,357	8,434	1,916	12,208	4,962	4,101	13,934
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	40,213	16,116	34,091	61,285	50,856	25,621	13,912	33,633	13,945	31,799	65,261
Wild/Scenic/Recreation Rivers (Acres)	0	0	0	0	0	0	0	0	0	0	0
Riparian Areas (954,000 acres) (414,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability											
Sitka Black-tailed Deer	21,833	7,942	13,967	44,421	24,742	13,208	6,391	15,500	1,477	7,143	283
Mountain Goat	0	558	0	0	466	0	0	0	1,572	968	2,923
Brown Bear	0	194	96	0	158	0	0	0	279	334	246
Black Bear	875	879	853	2,009	1,824	372	185	610	1,051	1,349	767
Wolf	80	42	56	168	113	45	22	56	19	39	11
Marten	1,060	681	496	2,008	1,620	421	220	646	507	949	243
Red Squirrel	359,830	340,573	319,934	0	752,910	0	0	0	325,434	452,828	282,585
River Otter	615	297	362	800	632	249	124	343	145	263	68
Bald Eagle	1,631	786	923	1,754	1,304	542	329	763	352	676	124
Hairy Woodpecker	7,149	4,450	3,932	13,476	10,304	2,469	1,496	4,386	3,119	4,893	1,529
Red-breasted Sapsucker	53,473	43,621	42,948	96,963	95,141	22,249	11,960	31,057	36,308	61,038	20,308
Brown Creeper	5,928	3,114	2,182	19,000	5,714	2,155	1,369	7,462	2,228	2,434	929
Vancouver Canada Goose	1,644	1,065	1,735	3,027	2,413	528	187	708	295	416	18,724

Table 3-11

Alternative A: Status of biological diversity elements within 21 Ecological Provinces in the 15th decade

Biological Diversity Element	1	2	3	4	5	6	7	8	9	10
					Ecological Province					
Total National Forest Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,648
Wilderness/Monument Acres	5,713	343,001	61,881	230,343	90,497	224,274	976,235	97,409	251,231	47,635
Natural Setting Acres	284,102	575,121	741,579	43,442	149,045	377,486	45,006	392,352	568,601	311,652
Research Natural Areas (Number)	1	1	2	1	0	1	2	2	2	2
Special Interest Areas (Number)	1	1	0	0	1	2	1	0	4	2
Productive Old Growth (Acres)	42,717	24,737	337,797	69,272	81,720	208,391	579,339	133,968	294,680	216,025
Unproductive Old Growth (Acres)	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810
Landscape Linkages										
Streams w/ 100 ft. buffers (Acres)	22,087	2,274	42,707	3,981	9,688	23,681	26,372	16,087	22,832	38,291
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	9,946	6,192	33,321	23,716	17,494	52,164	42,586	11,619	29,290	26,540
Wild/Scenic/Recreation Rivers (Acres)	9,848	180	9,396	0	3,401	5,637	0	25,268	33,181	36,189
Riparian Areas (954,000 acres) (396,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability										
Sitka Black-tailed Deer	0	0	19,251	7,375	3,559	16,367	31,624	1,108	2,170	13,668
Mountain Goat	3	95	0	0	294	392	0	444	801	0
Brown Bear	81	132	1,212	304	350	828	1,415	165	184	0
Black Bear	236	150	0	0	0	0	6	581	1,044	1,039
Wolf	11	3	0	0	0	0	0	13	20	60
Marten	272	112	1,100	301	245	744	1,644	379	715	946
Red Squirrel	284,498	161,330	581,168	158,140	151,002	376,864	681,905	239,896	424,423	382,336
River Otter	132	20	715	125	187	487	448	221	430	490
Bald Eagle	278	27	1,939	336	528	1,319	1,169	478	1,042	1,102
Hairy Woodpecker	1,682	512	6,681	1,087	1,056	3,067	12,638	2,334	5,087	3,962
Red-breasted Sapsucker	8,630	4,976	65,223	15,808	13,793	42,940	96,453	25,540	48,965	46,480
Brown Creeper	3,798	343	5,283	405	347	851	14,760	1,575	3,266	2,505
Vancouver Canada Goose	45	8	1,533	80	251	711	225	482	977	2,470

Table 3-11 (continued)

Biological Diversity Element	11	12	13	14	15	16	17	18	19	20	21
Total National Forest Acres	483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595
Wilderness/Monument Acres	127,020	278,170	82,122	39,868	240,118	33,597	0	85,431	794,936	904,304	990,598
Natural Setting Acres	180,963	313,491	120,785	501,887	590,143	125,125	76,527	196,408	159,767	0	1,995,863
Research Natural Areas (Number)	0	1	1	2	1	0	0	1	1	2	0
Special Interest Areas (Number)	1	1	0	5	2	2	4	0	0	2	1
Productive Old Growth (Acres)	225,359	202,500	140,811	316,046	409,362	92,029	45,457	125,794	198,205	311,665	114,802
Unproductive Old Growth (Acres)	91,402	159,276	187,590	414,436	460,297	70,764	29,898	2,604	244,428	326,556	143,241
Landscape Linkages											
Streams w/ 100 ft. buffers (Acres)	19,964	20,030	14,470	56,747	32,357	8,434	1,916	12,208	4,962	4,101	13,934
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	40,534	16,716	34,151	61,945	51,016	25,701	13,972	33,913	13,945	31,799	65,281
Wild/Scenic/Recreation Rivers (Acres)	9,431	34,878	7,085	43,828	18,220	0	4,356	17,818	13,287	0	61,676
Riparian Areas (954,000 acres) (396,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability											
Sitka Black-tailed Deer	17,742	6,588	10,095	27,768	20,404	10,462	4,798	13,209	1,444	7,143	274
Mountain Goat	0	550	0	0	451	0	0	0	1,571	968	2,923
Brown Bear	0	185	81	0	142	0	0	0	278	334	246
Black Bear	701	809	649	1,395	1,584	304	144	538	1,047	1,349	766
Wolf	76	37	43	112	96	36	17	49	18	39	11
Marten	842	595	371	1,292	1,341	340	162	544	503	949	242
Red Squirrel	283,512	310,664	234,007	0	641,894	0	0	0	323,733	452,828	282,177
River Otter	612	295	355	785	625	248	122	341	145	263	68
Bald Eagle	1,625	783	907	1,721	1,292	540	326	759	352	676	124
Hairy Woodpecker	5,240	3,805	2,485	7,650	8,089	1,823	979	3,423	3,081	4,893	1,524
Red-breasted Sapsucker	42,015	38,033	28,585	59,325	76,863	18,148	8,565	25,552	35,991	61,038	20,238
Brown Creeper	3,628	2,610	1,349	10,390	4,578	1,284	798	5,705	2,223	2,434	928
Vancouver Canada Goose	1,403	917	1,366	2,493	2,087	454	156	622	294	0	425

Table 3-12

Alternative B: Status of biological diversity elements within 21 Ecological Provinces in the 15th decade

Biological Diversity Element	Ecological Province 1	2	3	4	5	6	7	8	9	10
Total National Forest Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,648
Wilderness/Monument Acres	5,713	343,001	61,881	230,343	90,497	224,274	976,235	97,409	251,231	47,635
Natural Setting Acres	263,704	574,161	539,870	50,143	148,985	376,028	45,006	349,429	534,924	169,069
Research Natural Areas (Number)	1	1	2	1	0	1	2	1	2	2
Special Interest Areas (Number)	1	1	0	0	1	2	1	0	4	2
Productive Old Growth (Acres)	47,887	16,371	347,563	73,563	72,798	197,076	588,512	134,588	282,896	143,035
Unproductive Old Growth (Acres)	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810
Landscape Linkages										
Streams w/ 100 ft. buffers (Acres)	22,087	2,274	42,707	3,981	9,688	23,681	26,372	16,087	22,832	38,291
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	9,946	6,192	33,221	23,716	17,484	52,144	42,586	11,619	29,250	26,281
Wild/Scenic/Recreation Rivers (Acres)	9,828	180	3,520	0	3,401	2,042	0	8,335	439	18,552
Riparian Areas (954,000 acres) (391,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability										
Sitka Black-tailed Deer	0	0	17,380	7,401	3,556	16,056	31,570	1,033	1,995	12,406
Mountain Goat	3	95	0	0	294	392	0	444	795	0
Brown Bear	79	132	1,164	304	350	823	1,414	164	183	0
Black Bear	223	149	0	0	0	0	6	575	1,004	965
Wolf	11	3	0	0	0	0	0	13	20	56
Marten	249	111	1,005	302	245	735	1,642	375	677	848
Red Squirrel	267,883	161,150	541,878	158,864	150,970	372,843	681,088	237,185	406,355	349,610
River Otter	131	20	711	125	187	487	448	221	429	488
Bald Eagle	278	27	1,925	336	528	1,319	1,169	477	1,041	1,097
Hairy Woodpecker	1,414	510	5,930	1,094	1,055	3,018	12,621	2,280	4,812	3,283
Red-breasted Sapsucker	7,862	4,962	59,146	15,894	13,785	42,309	96,300	25,057	46,004	40,068
Brown Creeper	3,053	343	4,590	406	347	844	14,743	1,543	3,202	2,025
Vancouver Canada Goose	45	8	1,413	81	251	698	222	474	912	2,306

Table 3-12 (continued)

Biological Diversity Element	Ecological Province 11	12	13	14	15	16	17	18	19	20	21
Total National Forest Acres	483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595
Wilderness/Monument Acres	127,020	278,170	82,122	39,868	240,118	33,597	0	85,431	794,936	904,304	990,598
Natural Setting Acres	141,687	284,150	105,039	403,518	530,308	120,501	99,869	165,810	159,768	0	1,972,593
Research Natural Areas (Number)	0	1	1	2	1	0	0	1	1	2	0
Special Interest Areas (Number)	1	1	0	5	2	2	4	0	0	2	1
Productive Old Growth (Acres)	211,145	194,117	136,267	285,257	392,795	90,595	61,724	112,080	198,205	311,665	114,802
Unproductive Old Growth (Acres)	91,402	159,276	187,590	414,436	460,297	70,764	29,898	2,604	244,428	326,556	143,241
Landscape Linkages											
Streams w/ 100 ft. buffers (Acres)	19,964	20,030	14,470	56,747	32,257	8,434	1,916	12,208	4,962	4,101	13,934
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	40,494	16,676	34,211	61,945	651,016	25,721	14,052	33,833	13,945	31,799	65,261
Wild/Scenic/Recreation Rivers (Acres)	8,555	29,698	6,103	21,456	5,029	0	4,356	15,233	10,546	0	53,176
Riparian Areas (954,000 acres) (391,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability											
Sitka Black-tailed Deer	16,410	6,358	9,990	26,042	20,080	10,380	5,962	12,285	1,444	7,143	251
Mountain Goat	0	550	0	0	449	0	0	0	1,571	968	2,922
Brown Bear	0	182	77	0	142	0	0	0	278	334	245
Black Bear	671	793	640	1,306	1,554	302	175	511	1,047	1,349	762
Wolf	72	37	42	106	95		21	46	18	39	11
Marten	800	578	360	1,187	1,311	337	205	508	503	949	238
Red Squirrel	270,296	304,245	231,168	0	629,466	0	0	0	323,733	452,828	280,595
River Otter	612	295	355	783	623	248	124	338	145	263	67
Bald Eagle	1,626	782	907	1,717	1,288	540	329	755	352	676	121
Hairy Woodpecker	5,008	3,701	2,389	6,734	7,758	1,802	1,356	3,127	3,081	4,893	1,494
Red-breasted Sapsucker	39,044	36,730	27,929	53,433	74,517	17,952	11,169	23,378	35,991	61,038	19,927
Brown Creeper	3,552	2,563	1,258	9,221	4,271	1,259	1,134	5,320	2,223	2,434	919
Vancouver Canada Goose	1,326	883	1,357	2,356	2,041	451	178	588	294	0	420

Table 3-13

Alternative C: Status of biological diversity elements within 21 Ecological Provinces in the 15th decade

Biological Diversity Element	Ecological Province 1	2	3	4	5	6	7	8	9	10
Total National Forest Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,648
Wilderness/Monument Acres	5,713	343,001	61,881	230,343	90,497	224,274	976,235	97,409	251,231	47,635
Natural Setting Acres	247,088	574,141	437,769	24,809	122,282	212,962	6,347	301,074	325,372	71,842
Research Natural Areas (Number)	1	1	2	1	0	1	2	1	2	0
Special Interest Areas (Number)	0	1	0	0	0	0	1	0	4	0
Productive Old Growth (Acres)	22,422	24,737	304,192	69,392	76,411	204,613	563,097	125,095	269,515	171,326
Unproductive Old Growth (Acres)	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810
Landscape Linkages										
Streams w/ 100 ft. buffers (Acres)	22,087	2,274	42,707	3,981	9,688	23,681	26,372	16,087	22,832	38,291
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	9,946	6,192	32,923	23,636	17,394	51,862	42,506	11,439	28,910	25,979
Wild/Scenic/Recreation Rivers (Acres)	0	0	0	0	0	0	0	0	0	0
Riparian Areas (945,000 acres) (391,000 in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability										
Sitka Black-tailed Deer	0	0	15,786	7,182	3,242	13,527	30,760	915	1,734	11,577
Mountain Goat	3	95	0	0	291	387	0	442	786	0
Brown Bear	74	132	1,123	299	342	780	1,393	158	177	0
Black Bear	202	149	0	0	0	0	6	546	908	924
Wolf	11	3	0	0	0	0	0	12	19	53
Marten	211	111	919	290	228	647	1,601	338	556	790
Red Squirrel	243,059	161,014	508,674	153,758	144,190	336,757	666,561	223,437	359,350	330,772
River Otter	129	20	706	124	187	485	448	220	427	485
Bald Eagle	274	27	1,911	336	528	1,313	1,168	477	1,034	1,088
Hairy Woodpecker	1,071	507	5,325	1,033	951	2,522	12,297	2,013	3,742	2,899
Red-breasted Sapsucker	6,445	4,950	53,709	15,046	12,703	36,059	93,719	22,568	38,177	36,520
Brown Creeper	2,417	337	4,083	401	332	761	14,457	1,335	2,260	1,749
Vancouver Canada Goose	44	8	1,307	67	231	600	166	433	765	2,210

Table 3-13 (continued)

Biological Diversity Element	11	12	13	14	15	16	17	18	19	20	21
	Ecological Province										
Total National Forest Acres	483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595
Wilderness/Monument Acres	127,020	278,170	82,122	39,868	240,118	33,597	0	85,431	794,936	904,304	990,598
Natural Setting Acres	90,813	183,225	31,106	161,750	349,879	104,602	25,958	79,878	91,192	0	1,783,502
Research Natural Areas (Number)	0	1	1	1	1	0	0	1	1	2	0
Special Interest Areas (Number)	0	0	0	0	1	0	0	0	0	2	0
Productive Old Growth (Acres)	194,771	176,122	115,276	217,265	333,962	80,720	28,480	77,156	191,827	311,665	107,994
Unproductive Old Growth (Acres)	91,402	159,276	187,590	414,436	460,297	70,764	29,898	2,604	244,428	326,556	143,241
Landscape Linkages											
Streams w/ 100 ft. buffers (Acres)	19,964	20,030	14,470	56,747	32,357	8,434	1,916	12,208	4,962	4,101	13,934
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	40,213	16,116	34,091	61,286	50,856	25,621	13,912	33,633	13,945	31,799	65,261
Wild/Scenic/Recreation Rivers (Acres)	0	0	0	0	0	0	0	0	0	0	0
Riparian Areas (954,000 acres) (391,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability											
Sitka Black-tailed Deer	15,294	5,864	8,858	20,902	17,757	9,676	3,295	10,417	1,425	7,143	202
Mountain Goat	0	540	0	0	435	0	0	0	1,550	968	2,913
Brown Bear	0	177	73	0	128	0	0	0	275	334	242
Black Bear	631	759	589	1,131	1,435	283	105	459	1,032	1,349	746
Wolf	68	35	38	89	86	33	12	39	18	39	11
Marten	744	534	314	957	1,156	317	109	432	488	949	224
Red Squirrel	251,525	289,276	207,880	0	579,103	0	0	0	316,880	452,828	274,127
River Otter	612	291	352	778	618	248	121	335	144	263	66
Bald Eagle	1,625	770	900	1,706	1,278	540	323	748	350	676	119
Hairy Woodpecker	4,565	3,396	1,940	4,825	6,554	1,626	557	2,393	2,954	4,893	1,404
Red-breasted Sapsucker	35,910	33,873	23,901	40,311	64,649	16,383	5,287	19,243	34,999	61,038	18,823
Brown Creeper	3,092	2,384	978	6,544	3,663	1,110	368	3,943	2,089	2,434	887
Vancouver Canada Goose	1,251	811	1,242	2,110	1,871	422	124	521	270	0	394

Table 3-14

Alternative D: Status of biological diversity elements within 21 Ecological Provinces in the 15th decade

Biological Diversity Element	Ecological Province 1	2	3	4	5	6	7	8	9	10
Total National Forest Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,648
Wilderness/Monument Acres	5,713	343,001	61,881	230,343	90,497	224,274	976,235	97,409	251,231	47,635
Natural Setting Acres	258,820	570,538	377,974	49,923	113,594	131,995	29,450	389,205	373,424	100,929
Research Natural Areas (Number)	1	1	2	1	0	1	2	1	2	0
Special Interest Areas (Number)	0	1	0	0	0	0	1	0	4	0
Productive Old Growth (Acres)	26,702	24,737	271,874	69,432	75,135	207,496	569,969	127,323	264,670	155,363
Unproductive Old Growth (Acres)	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810
Landscape Linkages										
Streams w/ 100 ft. buffers (Acres)	22,087	2,274	42,707	3,981	9,688	23,681	26,372	16,087	22,832	38,291
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	9,946	6,192	15,571	23,716	9,049	27,620	39,062	9,500	18,247	12,273
Wild/Scenic/Recreation Rivers (Acres)	0	0	0	0	3,381	0	0	0	0	3,935
Riparian Areas (954,000 acres) (387,000 in Old Growth)	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability										
Sitka Black-tailed Deer	0	0	15,064	7,401	2,845	13,452	31,021	987	1,806	10,987
Mountain Goat	3	95	0	0	291	389	0	444	788	0
Brown Bear	76	132	1,095	304	330	768	1,400	163	173	0
Black Bear	212	149	0	0	0	0	6	573	946	907
Wolf	11	3	0	0	0	0	0	14	19	51
Marten	227	111	873	302	205	629	1,615	368	596	761
Red Squirrel	248,510	160,647	468,600	158,604	133,938	329,802	671,841	229,854	370,949	321,175
River Otter	131	20	578	125	129	394	424	208	353	404
Bald Eagle	271	26	1,187	336	310	972	1,095	386	703	840
Hairy Woodpecker	1,192	504	4,722	1,093	797	2,407	12,407	2,135	4,113	2,706
Red-breasted Sapsucker	7,110	4,939	49,283	15,886	11,423	34,718	94,851	24,218	40,176	35,140
Brown Creeper	2,492	328	3,581	406	278	688	14,574	1,344	2,750	1,612
Vancouver Canada Goose	44	8	1,255	81	205	602	186	472	826	2,164

Table 3-14 (continued)

Biological Diversity Element	Ecological Province 11	12	13	14	15	16	17	18	19	20	21
Total National Forest Acres	483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595
Wilderness/Monument Acres	127,020	278,170	82,122	39,868	240,118	33,597	0	85,431	794,936	904,304	990,598
Natural Setting Acres	50,692	259,196	24,808	211,244	422,107	82,916	26,775	39,690	109,324	0	1,888,456
Research Natural Areas (Number)	0	1	1	1	1	0	0	1	1	2	0
Special Interest Areas (Number)	0	1	0	0	1	0	0	0	0	2	1
Productive Old Growth (Acres)	170,420	178,859	107,966	212,166	358,035	75,827	27,377	55,079	193,890	311,665	110,744
Unproductive Old Growth (Acres)	91,402	159,276	187,590	414,436	460,297	70,764	29,898	2,604	244,428	326,556	143,241
Landscape Linkages											
Streams w/ 100 ft. buffers (Acres)	19,964	20,030	14,470	56,747	32,357	8,434	1,916	12,208	4,962	4,101	13,934
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	19,357	12,191	8,375	20,795	30,666	16,324	2,911	12,763	13,585	31,799	30,718
Wild/Scenic/Recreation Rivers (Acres)	100	7,944	0	3,638	3,004	0	0	0	5,284	0	24,919
Riparian Areas (954,000 acres) (391,000 acres in Old Growth)	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain	Maintain
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability											
Sitka Black-tailed Deer	13,467	5,754	7,749	20,001	18,370	9,191	2,926	9,262	1,422	7,143	217
Mountain Goat	0	548	0	0	437	0	0	0	1,561	968	2,917
Brown Bear	0	180	71	0	138	0	0	0	276	334	244
Black Bear	572	763	558	1,112	1,480	274	99	423	1,036	1,349	757
Wolf	62	35	35	86	88	32	11	36	18	39	11
Marten	644	534	290	898	1,204	292	95	375	490	949	233
Red Squirrel	220,497	286,036	188,105	0	587,425	0	0	0	317,115	452,828	276,937
River Otter	451	263	188	528	509	190	50	204	143	263	67
Bald Eagle	1,122	620	400	957	941	365	115	383	331	676	107
Hairy Woodpecker	3,858	3,328	1,679	4,350	6,894	1,482	473	2,012	2,962	4,893	1,442
Red-breasted Sapsucker	30,928	33,827	21,134	37,920	67,343	15,519	4,750	15,870	35,136	61,038	19,393
Brown Creeper	2,771	2,291	905	5,970	3,851	924	311	3,566	2,090	2,434	876
Vancouver Canada Goose	1,133	820	1,173	2,054	1,928	405	108	476	279	0	409

Table 3-15

Alternative P: Status of biological diversity elements within 21 Ecological Provinces in the 15th decade

	Ecological Province									
Biological Diversity Element	1	2	3	4	5	6	7	8	9	10
Total National Forest Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,648
Wilderness/Monument Acres	5,713	343,001	61,881	230,343	90,497	224,274	976,235	97,409	251,231	47,635
Natural Setting Acres	249,690	574,381	328,563	50,123	178,713	356,133	5,386	304,258	325,131	96,812
Research Natural Areas (Number)	1	1	2	1	0	1	2	1	2	2
Special Interest Areas (Number)	1	1	0	0	1	2	1	0	4	2
Productive Old Growth (Acres)	26,390	24,737	312,000	69,472	80,405	207,988	572,635	124,396	269,976	175,069
Unproductive Old Growth (Acres)	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810
Landscape Linkages										
Streams w/ 100 ft. buffers (Acres)	22,087	2,274	42,707	3,981	9,688	23,681	26,372	16,087	22,832	38,291
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	9,946	6,192	32,722	23,716	17,414	52,245	41,685	11,439	28,910	26,141
Wild/Scenic/Recreation Rivers (Acres)	9,427	180	0	0	3,401	0	0	6,218	0	4,858
Riparian Areas (954,000 acres) (387,000 in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability										
Sitka Black-tailed Deer	0	0	14,993	7,400	3,454	14,835	30,693	987	1,747	11,886
Mountain Goat	3	95	0	0	293	391	0	442	787	0
Brown Bear	75	132	1,095	304	347	801	1,391	159	177	0
Black Bear	208	149	0	0	0	0	6	551	912	938
Wolf	11	3	0	0	0	0	0	13	19	54
Marten	222	111	869	302	238	692	1,597	342	562	809
Red Squirrel	250,216	160,990	464,680	158,644	146,602	353,807	665,102	221,302	355,448	336,666
River Otter	129	20	705	125	187	486	443	220	427	485
Bald Eagle	274	27	1,908	336	528	1,317	1,153	477	1,034	1,089
Hairy Woodpecker	1,183	507	4,678	1,094	993	2,749	12,278	1,960	3,653	2,998
Red-breasted Sapsucker	6,780	4,947	47,647	15,890	13,199	38,933	93,461	22,464	37,631	37,503
Brown Creeper	2,739	337	3,582	406	308	788	14,449	1,221	2,210	1,817
Vancouver Canada Goose	44	8	1,242	81	242	643	160	439	770	2,244

Table 3-15 (continued)

Biological Diversity Element	Ecological Province 11	12	13	14	15	16	17	18	19	20	21
Total National Forest Acres	483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595
Wilderness/Monument Acres	127,020	278,170	82,122	39,868	240,118	33,597	0	85,431	794,936	904,304	990,598
Natural Setting Acres	180,338	205,054	34,542	251,898	378,432	117,531	40,540	124,466	91,431	0	1,858,554
Research Natural Areas (Number)	0	1	1	2	1	0	0	1	1	2	0
Special Interest Areas (Number)	1	1	0	5	2	2	4	0	0	2	1
Productive Old Growth (Acres)	226,576	171,061	116,583	225,586	342,165	86,307	31,433	102,875	194,526	311,665	108,586
Unproductive Old Growth (Acres)	91,402	159,276	187,590	414,436	460,297	70,764	29,898	2,604	244,428	326,556	143,241
Landscape Linkages											
Streams w/ 100 ft. buffers (Acres)	19,964	20,030	14,470	56,747	32,357	8,434	1,916	12,208	4,962	4,101	13,934
Beach/Estuary Fringe in Wilderness and Natural Settings (Acres)	40,454	16,636	34,091	61,485	50,856	25,660	13,892	33,693	13,945	31,799	65,261
Wild/Scenic/Recreation Rivers (Acres)	8,796	21,753	0	30,504	1,384	0	0	0	4,784	0	9,204
Riparian Areas (954,000 acres) (387,000 acres in Old Growth)	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve	Maintain/ Improve
Threatened & Endangered Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Sensitive Species	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
Estimated MIS Habitat Capability											
Sitka Black-tailed Deer	17,553	5,654	9,092	22,778	18,095	10,162	3,572	11,477	1,425	7,143	209
Mountain Goat	0	542	0	0	437	0	0	0	1,555	968	2,914
Brown Bear	0	179	74	0	129	0	0	0	276	334	243
Black Bear	698	752	596	1,183	1,453	297	114	483	1,038	1,349	749
Wolf	73	34	39	95	88	35	13	43	18	39	11
Marten	834	527	318	1,024	1,179	327	119	467	495	949	226
Red Squirrel	281,606	284,258	211,072	0	579,991	0	0	0	318,135	452,828	273,963
River Otter	612	293	352	779	619	248	122	337	144	263	66
Bald Eagle	1,625	778	901	1,708	1,280	540	324	751	350	676	120
Hairy Woodpecker	5,183	3,286	1,990	5,217	6,592	1,717	642	2,623	2,998	4,893	1,394
Red-breasted Sapsucker	41,526	33,119	24,436	43,156	65,066	17,484	5,923	21,086	35,320	61,038	18,891
Brown Creeper	3,626	2,286	978	7,129	3,578	1,135	538	4,204	2,129	2,434	860
Vancouver Canada Goose	1,394	797	1,257	2,179	1,895	442	127	553	275	0	399

Cultural and Historical

Affected Environment

Changes Since the DEIS

Since the DEIS, there have been no changes in inventory or other information.

Background

Cultural resources located in the Tongass National Forest include a diverse range of prehistoric and historic sites and artifacts that span approximately 10,000 years of human occupation and resource use. Prehistoric remains include campsites, village sites, graves, resource areas, rock art, portages, and rock shelters. Historic sites include houses, cabins, mines, quarries, trails, portages, tramways, salteries, canneries, boatworks, boats, shipwrecks, military installations and Civilian Conservation Corps trails, shelters, camps, campgrounds, and buildings.

Many of these cultural remains provide the only record of former human occupation, work areas, and lifestyles. Some of these sites may represent cultural traditions associated with early human migration into Alaska, and others may be significant for European exploration and historic economic development. Additionally, some areas may have traditional or spiritual significance for contemporary Native Americans. The recovery of information from these sites and objects is important in reconstructing previous human behavior and adaptation in response to environmental or social change. Cultural resources located on the Tongass National Forest represent an important part of our local, regional, and national cultural heritage.

Relatively high densities of undiscovered cultural resources are expected to be located within the Forest in the future. Between 1976 and 1986, approximately 68,000 acres of National Forest Lands were inventoried for cultural resources. Approximately 2,098 cultural resource sites have been identified, of which 983 sites have been field verified, 36 sites determined eligible, and five sites listed on the National Register of Historic Places. One site, Fort Durham, achieved National Historic Landmark status (Cultural Resource Overview, 1987; Alaska Heritage Resource Survey, 1989). To date, all previous surface inspections account for less than one percent of Tongass National Forest acreage. Information gathered from these inventory efforts will provide information about resource distribution, sensitivity to damage, and allocation of the resource.

Certain types of cultural resources such as sites, artifacts, and other observable results of human activity have a greater probability of being located in specific areas, including intertidal zones, beach fringes, riparian zones, areas of known mineral deposits, areas of other known resources, and uplifted fossil beaches. These generalized locations are also influenced by other environmental variables, such as slope, aspect, and elevation. The environmental characteristics that invited human use and habitation in prehistoric times are often the same factors which invite use today.

However, because of elevational and sea level changes after deglaciation, the location of the earliest human activity areas may be further inland and at higher elevations than more recent human activity areas. Some significant resource activity areas may occur at any elevation such as those associated with hunting and trapping, historic mining, and international boundary survey remains. Specific locations associated with Native American traditional and religious use are identified on an ongoing basis.

Methodology and Scientific Accuracy

The Forest has established and maintained a cultural resource management program to identify, evaluate, preserve, and protect significant cultural resources on a Forest-wide and project-specific level in compliance with the National Historic Preservation Act, as amended, as well as a number of other implementing regulations. The preservation and protection of the Forest's cultural resources are both closely associated with the location of the resource, the nature of the management activity, and the environmental characteristics where management activities occur. Impacts to the resource may occur from natural forces, from public access, or from project-related activities. Future management options will vary and are likely to include increased demand for scientific study and use for interpretation and public enjoyment.

Additional inventory information is gathered on an ongoing basis. Relatively high densities of cultural resource sites are expected to be discovered within the Forest in the future. To date, all previous surface inspections account for less than one percent of Forest acreage. Information gathered from continuing inventories will provide insight into resource distribution and the sensitivity of sites to damage. Further scientific study will increase knowledge about cultural traditions associated with early human migration and later exploration and development of the region, as well as human behavior in response to social and environmental change.

Cultural and Historical

Environmental Consequences

Direct, Indirect and Cumulative Effects

The preservation and protection of the Forest's cultural resources are both closely associated with the location of the resource, the nature of the management activity, and the environmental characteristics where management activities occur. Impacts to the resource may occur from natural forces, from public access, or from project-related activities.

Erosion and other environmental effects may deteriorate cultural resource sites through decomposition. This kind of resource damage is most evident in objects or structures made of wood. Stabilization, regular maintenance, rehabilitation or data recovery are means of preventing the loss of the sites and the information they contain.

Public use may destroy cultural resource sites through inadvertent damage caused by compaction, or other ground-disturbing activities. Vandalism, including relic collecting, defacement and theft results in the loss of information and destruction of the resource. Protection of significant cultural resource sites from public use includes the establishment of public education programs, maintaining confidentiality about specific-site locations, monitoring, and directing public use away from the most vulnerable sites.

Areas managed for recreation provide opportunities for protection and interpretation for public education and enjoyment. Active educational and interpretive programs may create a greater awareness of the importance of cultural resources to our heritage and foster a sense of stewardship while adding to the recreational experience. However, protective measures to control or eliminate intentional destruction of these areas by relic collecting, theft and other forms of vandalism must be implemented.

While multiple-use activities have benefited cultural resources by providing opportunities for inventory, evaluation and interpretation in remote areas of the Forest, ground-disturbing activities have the most potential to adversely affect cultural resources and their environmental settings. The amount of impact is determined largely by the location and nature of the activity, the characteristics of the soils, and the degree of use.

Cultural resource management may increase the cost of project implementation. Some areas may need to be avoided entirely in order to protect the cultural resource. This may result in greater expense in accessing sites and a loss of commercial products, such as timber or minerals. Protection of significant cultural resources often precludes the harvest of timber or mining activities within a designated site boundary. When preservation in place is not desired, or possible, costs may increase due to project delays for required mitigation. Normally, when the Section 106 process of the National Historic Preservation Act is completed early in the planning process, project delay or additional costs are minimal.

In all alternatives, the preferred management of sites eligible for, nominated to, or listed in the National Register of Historic Places shall be avoidance and protection. Potential effects from environmental modification may require mitigation to achieve an effect that is considered to be not adverse in consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. These potential effects are diminished when the physical settings around significant cultural resources are maintained in a natural state.

Land use designations having a high potential for major environmental modifications include Timber Production and Minerals. These allocations are most likely to affect significant cultural resources through alteration of environmental settings and the constraints imposed upon future

management options. In many instances, retention of a natural environment is crucial to imparting and protecting the values which qualify a cultural resource for National Register status. Opportunity for the identification of new sites is greatest within these areas because of the intensity of inventory efforts. Direct impacts may occur to sites that are determined to be ineligible for the National Register of Historic Places.

Land use designations having a moderate potential for environmental modifications include Experimental Forests, Scenic Viewshed, and Modified Landscape. These allocations are most likely to have a moderate impact on significant cultural resources through alteration of the environmental setting and constraints imposed upon future management options. Opportunity for locating new sites is high because of the intensity of inventory efforts. Future management options will vary and are likely to include increased demand for scientific study and use for interpretation and public enjoyment. Direct impacts may occur to sites that are determined to be ineligible for the National Register of Historic Places.

Land use designations having a low potential for environmental modifications include Wilderness, Wilderness National Monument, Nonwilderness National Monument, Research Natural Area, Beach Fringe, Stream and Lake Protection, Primitive Recreation, Enacted Municipal Watersheds, Old-Growth Habitat, Semi-Primitive Recreation, Other Areas, LUD II, Special Interest Areas, and Wild, Scenic or Recreation Rivers. These allocations are most likely to have a low impact on significant sites through alteration of the environmental setting and constraints imposed upon future management options. The emphasis for inventory to locate new sites will be diminished and management options will vary with Forest management constraints within these areas. Inventory and protection of cultural resources in these areas are subject to the same cultural resource management requirements as other areas of the Forest, however, inventory may be limited to project-specific activities.

An indirect effect common to all alternatives and prescriptions is that the discovery of new sites can lead to vandalism if the locations become known to the public. No cumulative effects are anticipated under any alternative.

Effects of Alternatives

Potential effects to cultural resources and the differences between some alternatives are difficult to measure. The difference in effects depends upon the intensity and amount of ground-disturbing activity. The amount of potential risk and the average annual intensity of ground disturbance for the first decade by alternative are displayed in Table 3-16 and Table 3-17.

Table 3-16

Acres of potential risk to cultural resources

	Land Use Designation Group		
Alternative	Wilderness and Natural Setting	Moderate Development	Intensive Development
A	13,745,717	2,430,471	821,069
B	13,030,968	2,123,603	1,842,686
C	11,221,919	2,627,300	3,148,037
D	11,466,480	1,381,932	4,148,845
P	11,763,591	2,753,901	2,479,766

Table 3-17
Average annual ground-disturbing activities, first decade

Alternative	Road Construction (Miles)	Timber Harvest (Acres)
A	139	11,900
B	161	15,000
C	225	17,600
D	228	18,800
P	205	15,900

Alternative A

Land allocations involve low to moderate alteration of the landscape, and represent a reduced level of ground disturbance from the current situation. Corresponding impact to cultural resources is expected to be low to moderate. Discovery and protection opportunities may be limited from a reduced inventory effort as compared to other alternatives.

Alternative B

Land allocations involve moderate alteration of the landscape, and represent a moderate level of ground disturbance from the current situation. Corresponding impact to cultural resources is expected to be moderate.

Alternative C

Land allocations involve maintaining current direction and program activities. Little change is expected in timber harvest levels, road construction activities, or other commodity-oriented projects which represent a moderate to high potential to impact cultural resources. Conflicts between cultural resources and other resource management activities are likely to occur with a corresponding need to mitigate adverse effects.

Alternative D

Land allocations involve increased levels of timber harvest and road building activities which represent a high potential to impact cultural resources. Conflicts between cultural resources and other resource management activities are likely with a corresponding need to mitigate adverse effects.

Alternative P

Land allocations involve a slight decrease in timber harvest levels, road construction activities and other commodity-oriented projects which represent a moderate to high potential to impact cultural resources. Conflicts between cultural resources and other resource management activities are likely with a corresponding need to mitigate adverse effects.

Mitigation

All alternatives include requirements for inventory, protection, preservation, interpretation and consultation with the State Historic Preservation Office as described in the Cultural Resource Standards and Guidelines (see Proposed Revised Forest Plan, Chapter 4). This compliance review process considers cumulative effects to cultural resources by any proposed action on National Forest Lands. Effects are avoided or mitigated through a variety of measures. Mitigation of adverse effects will result in the collection of information. The cumulative effect of data collection will result in an increase in knowledge of previous human settlement patterns and cultural development.

Mitigation of potential effects to cultural resources other than avoidance may include protective enclosures, systematic monitoring of project activities, or mandatory restrictions on project design. When impacts cannot be avoided, systematic recovery of the information through excavation, collection of materials, and detailed documentation may be required as determined through consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.

An Alaskan State Comprehensive Historic Preservation Plan is being compiled by the State Office of History and Archaeology. When completed, this plan will provide additional information and direction for consideration in evaluating and developing cultural resource management strategies.

Experimental Forests

Affected Environment

Changes Since the DEIS

The potential experimental forests identified in the DEIS no longer have potential for experimental forest purposes and are no longer being considered.

Background

Experimental forests provide areas for conducting manipulative research that serves as a basis for forest management. Natural resources in experimental forests are used or altered under controlled scientific studies.

Current Situation

Two experimental forests currently exist within the Tongass National Forest: Young Bay and Maybeso. (See map packet, Alternative C for locations.)

Maybeso

Established in the early 1950's as a part of an intensive research program to document the effects of large-scale clearcutting on hydrology, fisheries, and timber productivity, the Maybeso Experimental Forest is located on a large steep-sided alluvial valley with a south to southeast-facing aspect near the central-eastern coast of Prince of Wales Island in southern Southeast Alaska. By the early 1960's most of the experimental area had been harvested. Permanent research plots were established and monitored to study hillslope erosion, movement of large woody debris in and through streams, forest regeneration, and silvicultural responses to precommercial thinning. Most of these plots are still monitored.

Since nearly all of the commercial timber on the Maybeso Experimental Forest has been harvested, there are limited opportunities to design new experiments on anything but very young second growth. Only a limited variety of vegetation and timber types are now available within the area. Research completed here is of limited applicability to other areas of the Forest.

Young Bay

The Young Bay Experimental Forest is located just south of Juneau on northern Admiralty Island. Originally selected for long-term hydrologic and fisheries monitoring with a paired comparison between streams, this site was used extensively for fisheries and hydrology research in the 1960's and 1970's. Construction at the site includes artificial stream channels, labs, housing for field personnel, and installation of permanent weather monitoring stations.

The Young Bay Experimental Forest has an extensive terrace or bench underlain by poorly-drained marine silt (the Gastineau Formation) which extends across its lower slopes between sea level and an elevation of 100 feet. As a result of this formation, part of the forest is open and relatively unproductive, which is atypical of those normally managed for timber production in Southeast Alaska. Young Bay exhibits little forest vegetation-type diversity making its use for other studies difficult. High winds often limit winter access. There are no roads, and, to date, no experimental vegetation treatments have occurred.

Prior to the Tongass Timber Reform Act, lands to the east of the Young Bay Experimental Forest were allocated to LUD III. The Tongass Timber Reform Act has now designated these lands as the "Young Lake Addition" to be managed as part of the Admiralty National Monument and Kootznoowoo Wilderness.

Experimental Forest Proposals

No new experimental forests are being proposed for the Tongass Forest Plan Revision. Because of the Tongass Timber Reform Act legislation or other resource conflicts, Shaheen Creek, Trap Bay, Staney Creek and Chicken Creek Watersheds, which were identified as possible Experimental Forests, are no longer appropriate for consideration.

Forestry Science Lab (FSL) personnel in Juneau and Forest Service Staff on the three Administrative Areas have proposed and evaluated these and several other sites on the Forest for possible new experimental forests (Correspondence dated March 3, 1988, August 15, 1988, February 22, 1990, September 10, 1990, October 9, 1990, October 11, 1990, February 10, 1991; the Revision DEIS, pages 3-32 to 3-36). However, no new sites have been found which would provide for long-term experimental forest type research and which would not conflict with existing resource uses and/or other demands. At this time, no new experimental forests are being proposed.

The Forest Service is also proposing delisting Young Bay as an experimental forest because: 1) this area has limited research opportunity, and limited applicability to other areas of the Forest; 2) manipulative research may not be compatible with the adjacent, new Monument/ Wilderness addition.

Methodology and Scientific Accuracy

Forestry Science Lab scientists and Forest managers evaluated different areas for suitability as experimental forests. None of the areas proposed were found to be suitable after the Tongass Timber Reform Act legislation and a review of other resource needs and conflicts. FSL scientists and Forest managers agree that Young Bay would not be suitable as an experimental forest.

Experimental Forests

Environmental Consequences

Direct, Indirect and Cumulative Effects

No new experimental forest proposal occur in any of the alternatives.

Maybeso Experimental Forest

The Maybeso Experimental Forest on the Ketchikan Area will remain allocated to and managed as an experimental forest. Since there are limited opportunities to design new experiments within this area, little or no adverse research-induced effects are anticipated during the life of the Forest Plan. Minor natural changes in conditions could occur including such events as wind, fire, insects and disease.

The Karta Wilderness bounds this experimental forest on the north. In Alternatives A and B, the south and west sides of the experimental forest are allocated to semi-primitive recreation and the east side to scenic viewshed. Alternative C has timber production on the south and west sides and scenic viewshed on the east. Alternative D has semi-primitive recreation on the south and west and a minerals land use designation in the northeast quarter of the experimental forest. Alternative P has modified landscape on the south, timber production on the west and scenic viewshed on the east.

Under all alternatives, the Karta Wilderness protects the northern boundary from development influence. All the alternatives would allow some degree of management activity on the other three sides. None of the activity is anticipated to have any effect on the permanent research plots within the experimental forest. There are no known conflicts with the private land interests adjacent to the southeast side of the experimental forest boundary.

Young Bay Experimental Forest

The Young Bay Experimental Forest on the Chatham Area is allocated to land use designations other than Experimental Forest in all alternatives except Alternative C primarily because of its limited applicability to experimental vegetation treatment on the rest of the Forest. Alternatives A, B and D assign the Young Bay Experimental Forest to a semi-primitive recreation land use designation and Alternative P assigns it a modified landscape land use designation.

Several additional sites for experimental forests were identified and rejected as not suitable for various reasons including other resource needs and conflicts.

The nondesignation of areas to the experimental forest land use designation and subsequent alteration of their conditions over the planning period would result in an eventual reduction in research opportunities.

The Proposed Revised Forest Plan provides standards and guidelines to mitigate undesirable adjacency effects and to maintain research opportunities within the experimental forests.

Fire Management

Affected Environment

Changes Since the DEIS

There has been no change in the fire situation and no new information since publication of the DEIS.

Background

Wildfire occurrence on the Tongass National Forest has been historically low, due to an annual rainfall in Southeast Alaska which usually exceeds 100 inches. An annual average of 14 fires has been recorded in the National Fire Data Library records over the past 30 years, although the number each year varies considerably (see Table 3-18). Ninety-five percent of these fires were less than nine acres, with most less than one-quarter acre.

Types of Wildfire

Three types of wildfires, all human-caused, are common to Southeast Alaska: recreation beach fires, other inland or higher elevation recreational fires, and equipment fires. Lightning, which seldom occurs, and is usually accompanied by heavy rain when it does, is not considered to be a threatening factor in Southeast Alaska. Recreational beach fires and higher elevation fires that are left unattended comprise about 92 percent of fire occurrences in Southeast Alaska. Unsuppressed, they tend to spread very slowly and burn deeply. If left unsuppressed, these fires may result in some resource losses.

The remaining fires that occur on the Forest are equipment fires; those fires started from any mechanical, contractor, or equipment activities. Commonly associated with heavy concentrations of dead, woody logging debris (slash piles, decks, and slash remaining in the cutting units following logging), these fires tend to be larger than other fires. Equipment fires, because of their potential to grow larger, generally require more fire suppression forces.

Current Situation

There are no fully-funded fire personnel on the Tongass National Forest. Fire suppression forces are comprised of permanent and seasonal employees from all disciplines. Their role is to be trained, qualified, equipped, and seasonally prepared to assist in wildfire suppression on the Forest. In addition, Tongass fire suppression forces provide assistance to the Chugach National Forest, to the interior of Alaska, and to other states.

No direction for fire management is included in the 1979 Forest Plan. Since 1985, fire management program emphasis in Alaska has grown. Forest Service employees are better trained and better equipped, and many have had the opportunity to participate in suppression assignments within Alaska and in other states. Prescribed fire programs have emphasized the wise use of fire. Contingency plans have been developed to deal with unforeseen problems in prescribed fire use such as weather changes. Examination of the earlier prescribed fire program shortcomings and failures has been used to build a string of recent successes.

The Tongass National Forest's fire management direction has been to attack and suppress all wildfires as quickly as possible regardless of vegetation type, burning conditions, fuel loading (the amount of fuel per area), or land management objectives. This direction has evolved into one that stresses cost-efficient suppression based on objectives for the appropriate suppression action, and is supported by an Escaped Fire Situation Analysis.

State and private lands lie within or adjacent to National Forest lands. Through cooperative fire protection agreements based on economics and the "closest forces concept," the Forest Service has assumed all initial attack responsibilities for forested lands in Southeast Alaska. This agreement provides suppression personnel, equipment, and support for up to 24 hours at no cost to the benefitting agency. This agreement and other Regional fire direction is contained in the Alaska Interagency Fire Management Plan (May 1988), which has been incorporated into the Forest Plan Revision by reference.

Table 3-18

Tongass National Forest wildfire occurrence summary: 1958-1988

Year	A	B	C	D	E	Total Fires	Total Acres
	Number of Fires by Class[1]						
1988	5	12	3	-	-	20	112.4
1987	15	3	2	-	-	20	61.0
1986	10	8	-	-	-	18	4.1
1985	12	-	-	-	-	12	2.1
1984	7	-	-	-	-	7	1.0
1983	18	3	-	-	-	21	4.3
1982	23	1	-	-	-	24	3.3
1981	6	4	-	-	-	10	4.6
1980	8	1	1	-	1	11	612.8
1979	14	2	-	-	-	16	3.4
1978	18	4	-	-	-	22	39.8
1977	20	1	-	-	-	21	3.0
1976	9	-	-	-	-	9	1.0
1975	18	-	1	-	-	19	13.8
1974	12	3	-	-	-	15	8.2
1973	10	-	1	-	-	11	22.0
1972	8	-	1	-	-	9	9.1
1971	13	3	1	-	-	17	72.6
1970	5	-	-	-	-	15	—
1969	4	-	-	-	-	4	0.4
1968	22	4	1	1	-	28	136.9
1967	11	4	1	1	-	17	67.6
1966	6	-	-	-	-	6	0.6
1965	16	1	1	-	-	18	28.1
1964	8	-	-	-	-	8	1.0
1963	1	6	2	-	-	9	68.1
1962	3	1	-	-	-	4	1.2
1961	3	-	-	-	-	3	0.2
1960	12	2	1	-	-	15	51.7
1959	5	-	-	-	-	5	1.0
1958	21	3	3	-	2	29	1,467.9
Totals	**344**	**66**	**19**	**3**	**2**	**435**	**2,904.3**
		(79%)	(15%)	(4%)	(1%)	(1%)	(100%)

Average Number of fires per year = 14. Average acres per fire = 6.7

Source: Regional Fire Records Library, Anchorage, Alaska.

[1] Fire Class Legend:

A = 0-.25 acres

B = .26-9 acres

C = 10-99 acres

D = 100-299 acres

E = 300-999 acres

Prescribed Fire

In recent years, the prescribed fire program on the Tongass National Forest has increased. Prescribed burning programs use fire as a tool in accomplishing silvicultural and wildlife resource management objectives. However, due to the need for extensive prescribed fire and fire behavior training, growth of these programs has been slow.

Prescribed fire has the potential to play an important role as a tool in managing forest ecosystems, although the use of prescribed fire will continue to be constrained by the cost and difficulty of accessing areas, by smoke management policies, and, to a lesser extent, air quality requirements.

Future Trends

As recreational use of the Tongass grows, so will the incidence of fire within recreational sites. Historically, these fires have caused site-specific damage to confined areas, but are insignificant on a Forest-wide basis. This trend is expected to continue with perhaps a slight increase in acreage burned in the future.

If vegetation management and wildlife enhancement projects increase, the need for prescribed burning or slash treatment may increase in the future.

Several factors will continue to affect fire management activities on the Tongass National Forest. The greatest impact to the fire management program will be if budgets decrease, resulting in a corresponding decrease in the number of people with wildfire responsibilities on the Forest. There will be continued emphasis on training and equipping qualified people, and the need to train people from all disciplines for initial attack and suppression assistance will increase. Emphasis on cooperative firefighting agreements will continue to be very important.

Methodology and Scientific Accuracy

The effects of fire on Southeast Alaska forest ecosystems is a research need that has not been previously addressed.

There is little knowledge of the effect of increased activity fuel loading (the amount of burnable forest debris left after logging) on fire hazard. Natural decay is sufficient to accomplish silvicultural objectives. It is uncertain whether the decay is sufficient to meet fire hazard reduction standards.

Fire Management

Environmental Consequences

Fire has not been an important agent of change in Southeast Alaska and is not expected to be in the foreseeable future. This is primarily a result of the precipitation, rain and snow in the winter, and rain in the summer, that is characteristic of the Tongass National Forest. However, in some isolated tracts of land scattered throughout the Forest, fire has played a significant role in structuring the residual vegetation.

Direct and Indirect Effects

A number of factors play a role in determining the effects of fire on Forest resources, and how large, damaging, and costly a wildfire can become. All wildfires will continue to be suppressed with an emphasis on the "least cost plus resource loss" strategies (see Standards and Guidelines for Fire Management in the Proposed Revised Forest Plan, Chapter 4). Forest fuels and fire occurrence are two aspects of the fire environment sensitive to the management activities proposed by alternatives.

Forest Fuels

Forest fuels consist of vegetative material, living or dead, that can burn during a fire. Although fuels accumulate and decay at natural rates in the forest ecosystem, the logging slash left after timber harvest and road construction accelerates the natural process of accumulation and generates the greatest impact on forest fuels. Limbs, tops, and cull logs hamper reforestation efforts, increase overall forest flammability, and have the potential to generate high intensity fires that are difficult to control.

Because the amount and arrangement of fuels are important variables in the Forest environment, the reduction of fire hazard is balanced with other resource concerns. The presence and distribution of woody debris provides habitat for animals and insects. For example, fallen logs provide important habitat for some wildlife, particularly marten. Dead and down vegetative material also contributes to nutrient recycling, part of the ecological cycle. To provide shade and organic matter for new seedlings, a specified amount of cull logs and debris are essential after harvest. Research shows that decaying logs promote fungi that aid in decomposition of organic material and subsequent reforestation.

The Tongass has a limited forest fuels management program. When fuels are treated, prescribed burning is the most common fuel treatment used, however, the annual acreage treated is low in comparison to the number of acres harvested annually. Because the Tongass relies on natural reseeding and growth for the reforestation of most harvested areas, and fuel reduction is not necessary. Prescribed burning may also be used to improve wildlife habitat.

The higher levels of timber activity and road construction in Alternative D could potentially increase the fuel loading in timber harvest areas. Alternatives C and P would maintain the existing situation. Alternatives B and A would create amounts less than the existing condition.

All of the alternatives will provide for the suppression of wildfires to protect Forest resources and the property and lives of adjacent landowners. Fire occurrence can be expected to vary among alternatives due to the proposed amounts of recreation use, timber harvest and prescribed burning.

Because timber harvest units generally have large amounts of fuel, fires in logging slash have the potential to burn with high intensity and severity. Although prescribed fires are conducted under specified conditions with an approved burning plan, slash burns can escape control. Unexpected changes in weather conditions, particularly erratic, strong winds, pose additional risks during the mopup phase of prescribed burning. Escaped prescribed burns can be difficult to control and can cause damage to adjacent timber and reproduction.

The road construction, timber harvest, and timber improvement industrial operations may increase the risk fire starts. Ignition sources are increased as workers operate equipment such as saws, combustion engines, and cable harvest systems. Fires resulting from industrial operations have the potential to cause extensive damage to cut timber, residual stands, and expensive logging equipment. The prevention of industrial operation fires is a major portion of wildfire prevention under each alternative. The higher levels of timber activity in Alternative D will increase the chances of industrial fires over the current level. Alternatives C and P will maintain the existing situation. Alternatives B and A will have lower chances.

While an increase in dispersed recreational use of the Forest will increase the risk of human-caused fires, increased use of the Forest also contributes to early detection and, in some cases, suppression of small fires by recreational users. Alternative A would be expected to have the highest number of recreation fires, with Alternatives B, P, C and D having lower potential. Fires associated with industrial operations are generally accessible by recreational use fires are often started in areas without roaded access. Difficulty of access increases the cost and response time for fire suppression equipment and personnel.

Cumulative Effects

In the past, fire has not played a significant role in shaping the vegetative structure of the Tongass National Forest. Since implementation of the 1979 Forest Plan, fire's effect on the Forest has been insignificant. Effects associated with reasonably foreseeable future activities are expected to be similar to historic patterns.

The use of prescribed fire may result in changes to the cumulative fuel loading of the Forest over time. As the knowledge of the use and effects of prescribed burning increases, so may its use.

Mitigation

Forest Service timber sale contracts specify the measures, additional people and equipment required for the prevention, early detection, and suppression of fires within a project area. Intensified fire prevention contacts also will be used to increase public awareness.

In designated Wilderness, natural fire occurrence is extremely low. Currently, any wildfire that starts in Wilderness or National Monument Wilderness is attacked using the suppression response prescribed for that land use designation. Prescribed natural fire may be allowed in Wilderness only if it is adequately addressed in the wilderness plan for a given area and the implementation is adequately addressed in the Fire Management Action Plan. Although due to summer rainfall and the infrequent electrical storms, the Tongass National Forest does not have a prescribed natural fire program.

To minimize and avoid adverse effects on resources, certain fire behavior characteristics can be controlled during management-ignited prescribed fire. Both fire intensity and duration can be controlled to reduce impacts on vegetation and soils. Management-ignited prescribed fires can be scheduled for periods when fuel moistures are higher, to lessen the amount of heat generated and amount of material consumed by the fire. Low to moderate intensity fires are used to protect the duff layer and maintain soil nutrients. Ignition patterns can be controlled to produce shorter flame lengths and slower spread, thus reducing the damaging effects of heat transfer from the flames. To manage the potential impacts of smoke on air quality, slash burns are scheduled for times when conditions permit dispersion away from smoke-sensitive areas. Aggressive mopup activity may be used to reduce the duration of the fire if it is necessary to reduce adverse effects on air quality.

Fish

Affected Environment

Changes Since the DEIS

Tongass Timber Reform Act

The primary change since release of the DEIS results from passage of the Tongass Timber Reform Act of 1990 (TTRA). TTRA Section 103(a) reads, in part:

> SEC. 103. FISHERIES PROTECTION.
>
> (a) Section 705 (16 U.S.C. 539d) of ANILCA is amended by adding at the end thereof the following new subsection: "(e) In order to assure protection of riparian habitat, the Secretary shall maintain a buffer zone of no less than one hundred feet in width on each side of all Class I streams in the Tongass National Forest, and on those Class II streams which flow directly into a Class I stream, within which commercial timber harvesting shall be prohibited, except where independent national forest timber sales have already been sold.... The Secretary shall use best management practices, as defined in the Region 10 Soil and Water Conservation Handbook (FSH 2509.22), January 1990, to assure the protection of riparian habitat on streams or portions of streams not protected by such buffer zones. For the purposes of this subsection, the terms 'Class I streams' and 'Class II streams' means the same as they do in the Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986."

The objective of this section of the Tongass Timber Reform Act is to assure the protection of riparian habitat and to protect fisheries through the application of buffer zones not less than one hundred feet in width and application of best management practices. Standards and guidelines in the proposed plan have been adjusted to reflect these objectives. In particular, standards and guidelines now reflect the requirement for stream buffer zones. With this requirement, and the use of best management practices along other streams and other portions of the watershed which could affect the beneficial uses of water, the fish habitat models show that there should be no reduction in fish habitat capability as a result of future forest management. Portions of both fisheries affected environment and environmental consequences discussions have been revised accordingly.

Display of Data

Data in the DEIS were displayed in many of the tables by geographic zones. As geographical delineators, geographic zones are replaced in the supplement by the 141 TLMP Management Areas as formulated for the 1979 Tongass Land Management Plan (as amended) and altered by TTRA. Geographic zones have been referred to, but generally data are re-aggregated by TLMP Management Area. (See map packet, no action alternative.)

Fish Improvement Project List

The inventory of potential fish habitat improvement projects has been updated to 1991. The new projects and their benefits have been incorporated into tables in both the affected environment section, as well as in the environmental consequences section. These projects are also represented in the Proposed Plan and in the section on estimated outputs from each alternative.

Other

Wording changes have been made based on new information and comments received from the public. New sources of information have been referenced, and other minor changes have been made.

Background

Fish and the aquatic resources on the Tongass National Forest provide major subsistence, commercial, and sport fisheries. Abundant rainfall, streams with glacial origins, and watersheds with high stream densities provide an unusual number and diversity of freshwater fish habitats. These abundant aquatic systems of the Tongass provide spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat, and associated high quality water, is a focal point of public, State and Federal natural resource agencies, as well as user groups, Native organizations and individuals.

The Forest includes approximately 42,500 miles of streams, more than any other in the National Forest system. In addition, there are 20,200 lakes and ponds totaling 260,000 acres. Table 3-19 shows the estimated distribution of lakes and stream miles by category of fish use.

Table 3-19
Streams, lakes, and type of fish use

Fish Habitat	Stream Miles	Numbers of Lakes and Ponds	Acres of Lakes and Ponds
Anadromous	12,200	4,100	55,400
Resident	11,800	4,800	63,700
Non-fish Habitat	18,500	11,300	148,900

Source: Tongass National Forest GIS queries, with adjustments for uninventoried areas.

Fish Species

Thirty-seven freshwater and anadromous fish species are found in the freshwaters of Southeastern Alaska (Taylor, 1979). Eight of these are primarily marine species, ten species are uncommon freshwater, and 19 are common freshwater or anadromous species. The primary species harvested for sport, subsistence or commercial uses are shown in Table 3-20.

Thirty-six species of marine invertebrates (species without vertebrae, such as clams and crabs) are commonly found in the near-freshwater environment (Taylor, 1979). Although these are marine dwellers, some may be affected by upland management activities, such as timber-harvest-related log transfer and storage facilities. Species which may be particularly sensitive to upland management include the king (*Paralithodes sp.*), dungeness (*Cancer magister*) and tanner crabs (*Chionocoetes bairdi*), and butter clams (*Saxidomus giganteus*).

Table 3-20

Commonly harvested sport, subsistence and commercial fish[1]

Species[2]	Sport	Subsistence	Commercial
Pacific herring (*Clupea harengus pallasi*)	X	X	X
Pink salmon (*Oncorhynchus gorbuscha*)	X	X	X
Chum salmon (*Oncorhynchus keta*)	X	X	X
Coho salmon (*Oncorhynchus kisutch*)	X	X	X
Sockeye salmon (*Oncorhynchus nerka*)	X	X	X
King salmon (*Oncorhynchus tshawytscha*)	X	X	X
Cutthroat trout (*Oncorhynchus clarki*)	X	-	-
Rainbow trout & steelhead (*Oncorhynchus mykiss*)	X	-	-
Dolly Varden char (*Salvelinus malma*)	X	-	-
Eulachon smelt (*Thaleichthys pacificus*)	-	X	-

[1] X = Common use.

[2] Alternate names commonly used for the same species are: pink or humpback; chum or dog; coho or silver; sockeye or red; king or chinook; eulachon or hooligan or candlestick.

The Fisheries Resource

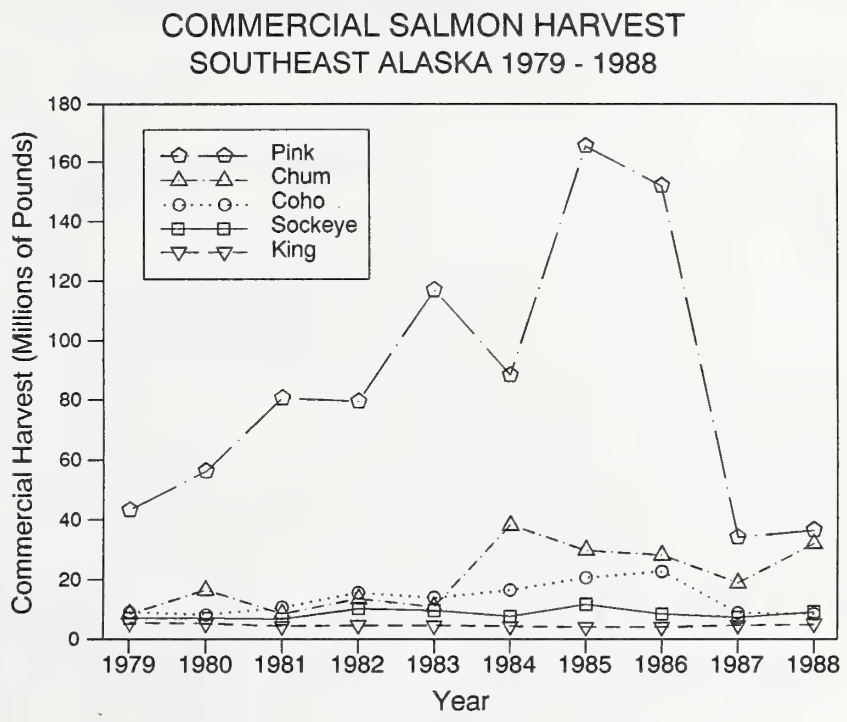
Subsistence, and the commercial harvest of fish, provide a way of life and a major source of food for many Southeast Alaska residents. Sport fishing is a favorite activity of residents and visitors. Hatcheries, and the improvement of wild fish habitat, among other aquaculture projects, help to provide continued resource availability and abundance. The Alaska Department of Fish and Game is responsible for regulating the amounts of fish harvested.

Subsistence fish harvest is discussed in the Subsistence section of this chapter. Commercial and sport fishing, and fishery projects, are discussed here.

Commercial fish harvest. There are two major categories of commercial fish in Southeast Alaska: fish dependent only on marine resources, such as most bottom fish (for example cod and halibut) and herring; and those that are dependent on both salt water and fresh water, such as the anadromous salmon and steelhead trout. Management of National Forest System lands primarily affects the availability of the second group.

Figure 3-3 shows the pounds of commercially harvested salmon during the last ten years (Alaska Department of Fish and Game, 1989). The figure indicates that there are large annual harvest fluctuations, and that pink salmon is the most harvested, followed by chum, coho, sockeye and king salmon.

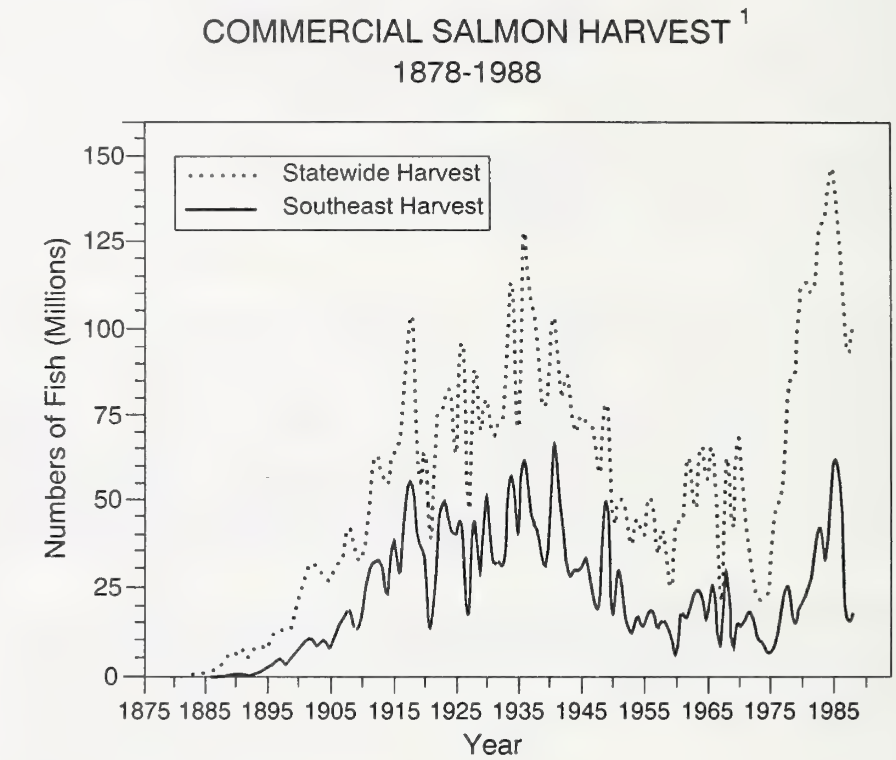
Figure 3-3



Source: Alaska Department of Fish and Game: Catch and Production Reports; 1989

To place the last ten years of harvest into long-term perspective, Figure 3-4 shows harvests Statewide and in Southeast Alaska since 1878 (Alaska Department of Fish and Game, 1989). Southeast Alaska harvest of salmon peaked in approximately 1935-1940 at 50 million fish, followed by a steady decline to less than 20 million fish in about 1950. Harvests were generally very low from 1950-1975 with a record recent low of under 6 million fish in 1975. Since 1975, there has been an increased harvest trend, including the setting of a near record in Southeast of approximately 60 million fish in 1985. Preliminary information shows that 1989 harvests may have been an all time record high.

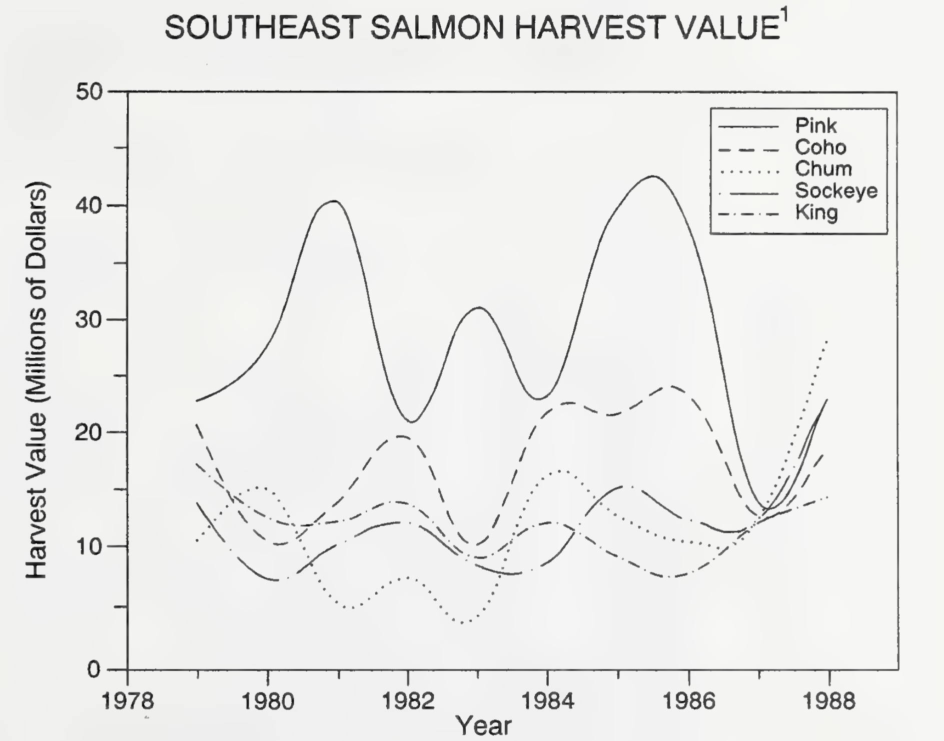
Figure 3-4



Source: Alaska Department of Fish and Game, 1989
[1] Data are curve fitted

The value of the commercial harvest has varied, similar to the variations in harvest. Figure 3-5 shows the value of commercial salmon harvest by species during the past 10 years.

Figure 3-5



Source: Alaska Department of Fish and Game: Alaska Catch and Production Reports
[1]Data are curve fitted

Sport Fishing Use. Approximately 18 percent of the sport fishing in the State of Alaska occurs in Southeast Alaska. Of this, approximately 85 percent occurs in the vicinity of the Tongass National Forest (calculated from Mills, 1987).

Table 3-21 shows the number and type of fish sport harvested in the vicinity of the Tongass's three Administrative Areas.

Table 3-21

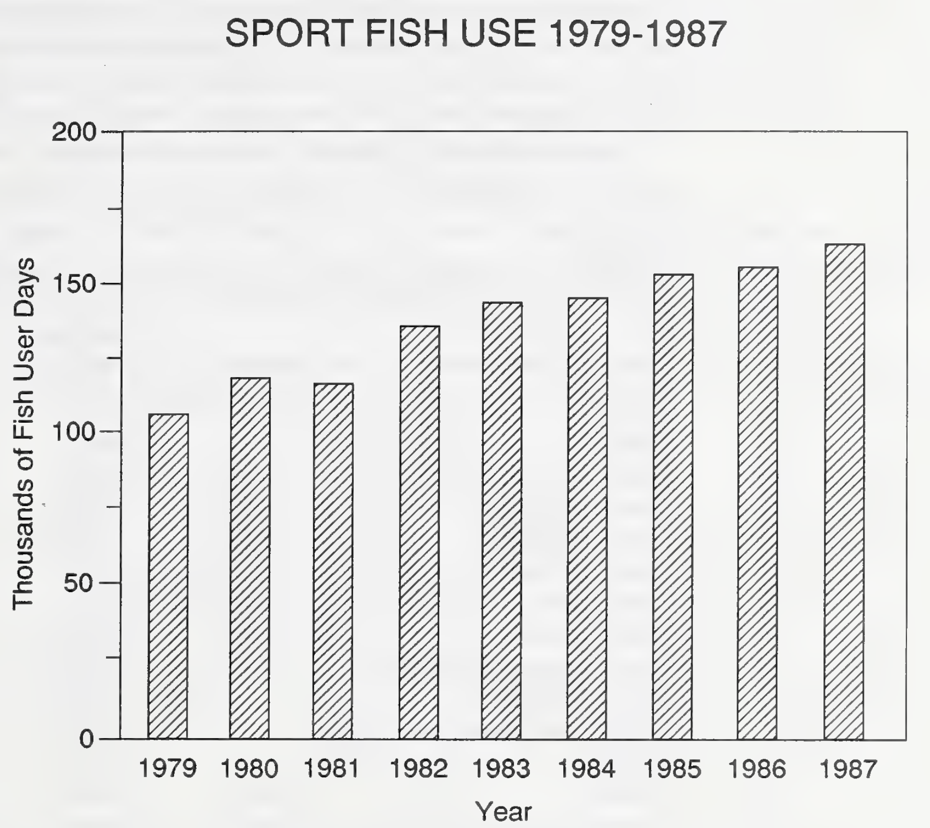
Numbers of fish harvested by sport anglers

Year	Anadromous Salmon	Other Fish	Total
Chatham Area			
1984	56,269	89,195	**145,464**
1985	84,357	74,657	**159,014**
1986	48,877	63,122	**111,999**
Stikine Area			
1984	9,487	21,365	**30,852**
1985	8,553	11,434	**19,987**
1986	6,878	23,148	**30,026**
Ketchikan Area			
1984	57,889	57,125	**115,014**
1985	53,351	73,807	**127,158**
1986	59,097	68,800	**127,897**
Average Annual Total	**128,250**	**160,880**	**289,130**

Source: Data base queries from the Alaska Statewide Sport Fisheries Harvest Report, Alaska Dept. of Fish and Game, Michael J. Mills, November, 1987. Obtained with the assistance of Mark Schwan, Alaska Dept. of Fish and Game, Southeast Regional Office, 1989. The data represents sport fishing for fish linked to habitats on the Tongass National Forest. Haines-Skagway and Glacier Bay Census Areas are not represented in this data.

The numbers of fish harvested represent sport fishing effort. Effort is also represented by Fish User Days (FUD's) which each count for 12 hours of fishing time. Figure 3-6 shows the number of FUD's attributable to the National Forest from 1979 to 1987. Except for a small decrease in 1981, sport fishing effort has increased consistently from 1979 to 1987.

Figure 3-6



Source: Mills, 1987 and Personal Communications with Mark Schwan (ADF&G, 1989)

Hatcheries, aquaculture & other fish enhancement. A variety of aquaculture projects, including hatcheries and fishery enhancement projects, have been developed on the Forest. Coordination and construction of projects to meet fisheries goals occurs at multiple levels and by a number of different organizations.

Comprehensive Salmon Plans have been developed for three areas of Southeast Alaska, including Northern Southeast, Southern Southeast, and Yakutat (Alaska Department of Fish and Game, 1984; Joint Southeast Alaska Regional Planning Teams, 1981; Northern Southeast Regional Planning Team, 1982-present; Southern Southeast Regional Planning Team, 1983-present). These documents include enhancement goals and attainment strategies. The goals are displayed in the demand portion of this fish section.

Three groups coordinate fish enhancement and development activities in Southeast Alaska: the Northern and Southern Southeast Regional Planning Teams (RPT's), and the Yakutat Salmon Planning Group. The Alaska Department of Fish and Game, Division of Fisheries

Rehabilitation, Enhancement and Development (FRED) facilitates the activities of the coordinating groups. Organizations which implement the aquaculture projects include the State of Alaska, private non-profit aquaculture organizations, the Regional Aquaculture Associations, the USDA Forest Service, and additional cooperators. Some examples of cooperators include: the timber industry, Trout Unlimited, and local communities.

Table 3-22 is a summary of the enhancement projects completed by the Tongass National Forest during the last 10 years. The table shows that an estimated potential production of approximately 11.5 million pounds of fish can be attributed to the 104 fisheries enhancement projects completed between 1980 and 1989. About 6.4 million dollars of direct project costs were expended by the USDA Forest Service and at least 3.4 million dollars were invested by the Alaska Department of Fish and Game and the Regional Aquaculture Associations for these projects. Additional funds have been spent for inventory, planning projects and monitoring.

Table 3-22

Fisheries enhancement projects completed 1980-1989

Enhancement activity	# Projects[2]	Production (M lbs/yr)[3]	Cost (M $)[1] Federal[4]	Other[5]
Fishways	26	3,861.9	3,353.8	205.0
Falls modification	5	63.5	92.0	0.0
Spawning channel	5	329.4	365.5	85.0
Debris removal	10	76.0	19.0	0.0
Lake fertilization	5	4,551.0	1,200.7	1,557.0
Lake stocking	8	1,242.0	521.1	1,170.3
Stream stocking	18	484.7	153.6	223.0
Rearing pond construction	7	16.3	86.6	0.0
Incubation boxes	3	833.9	53.0	105.2
Large woody debris management	15	81.6	564.6	30.0
Fish weir	3	NA	0.0	NA
Totals	**104**	**11,540.7**	**6,409.9**	**3,375.5**

Source: USDA Forest Service, Alaska Regional Office. Obtained from Ron Dunlap, Wildlife and Fisheries.
Abbreviations: NA = not available; # = number; M = thousand.

[1] Costs shown in the table are direct project costs (i.e., construction) and do not include indirect costs such as program planning.

[2] The project totals represent the number of activities completed at different locations. Repetitive annual investments at the same site (i.e. fertilizer applied to each lake annually) are not shown, although the costs of the repetitive treatments have been included in the cost totals.

[3] Estimated salmon production (available for harvest) is based on full utilization of habitat capability. The time it will take to reach full production varies with the species and fisheries management strategies regulating the fish stocks returning to the projects.

[4] Construction funds only. Alaska Department of Fish and Game salmon broodstock development costs associated with some fishway projects were not available.

[5] Combined investments of the Alaska Department of Fish and Game and the Regional Aquaculture Associations. Cooperative investment information for the majority of the projects involving these agencies was not available.

Of the projects completed, most have been fishways and stream stocking, with the largest outputs anticipated from lake fertilization, fishways and lake stocking projects. Prior to 1980, a considerable number of additional projects were also implemented on the Tongass National Forest.

Fish habitats. With over 40,000 miles of streams and 260,000 acres of ponds and lakes, the Forest provides abundant fish habitat. The habitat has been inventoried and classified, and estimates made of fish production. Management Indicator Species are used as a tool to help represent the value of the habitat for all fish species.

Channel Inventory. Perennial streams, outside of most wilderness, have been channel-type inventoried. Individual channel types have fairly consistent physical and biological characteristics (Marion et al., 1987). The channel types provide a system to measure the amount and quality of fish habitat and can be used to predict their physical response and sensitivity to different management activities. Channel types have been categorized into distinctly different groups, called "stream process groups." The process groups are described in Appendix D of the Proposed Revised Forest Plan.

Stream Class Inventory. Channel typed streams have also been categorized by stream class, a classification primarily associated with fish use. Class I streams are anadromous and high value fish streams, Class II streams are other resident fish streams, and Class III streams are managed for water quality. (See the glossary for more complete definitions.)

Table 3-23 displays, by Administrative Area of the Tongass, the estimated miles of streams, their process group and stream class.

Table 3-23
Miles of streams by process group, area and stream class[1]

Stream Process Group	Class	Chatham	Stikine	Ketchikan	Total
Low Gradient Floodplain	I	2,595	963	1,368	4,926
	II	84	188	15	288
	III	2	14	13	28
Alluvial Fan	I	517	58	140	715
	II	764	100	193	1,057
	III	115	98	30	243
Mixed Control Moderate Gradient	I	837	1,327	1,519	3,684
	II	502	357	83	942
	III	0	34	67	100
Large Low Gradient Contained	I	286	164	222	672
	II	14	28	0	42
	III	0	0	0	0
Moderate Gradient Contained	I	595	466	978	2,039
	II	173	206	114	493
	III	0	37	83	120
High Gradient Contained	I	24	107	53	184
	II	3,489	914	2,176	6,578
	III	7,477	4,856	5,515	17,847
Placid or Glide Streams	I	427	285	401	1,114
	II	55	55	16	127
	III	0	5	19	24
Lakes and Ponds[2]	I	162	195	155	512
	II	1	10	3	15
	III	0	0	0	1
Estuarine	1	347	157	173	677
	II	0	0	0	0
	III	0	0	0	1
Administrative Area Totals	I	5,790	3,724	5,009	14,523
	II	5,082	1,859	2,601	9,542
	III	7,594	5,043	5,727	18,364
Forest Total (miles)	**All streams**	**18,466**	**10,626**	**13,337**	**42,429**

Source: Tongass National Forest GIS queries

[1] Miles are adjusted for estimates of: 1) the uninventoried wilderness areas; and 2) channels missed in the inventories. Additional unmappable streams are present, but undetectable except with complete on-the-ground surveys. These streams cannot be mapped within the tolerances of the channel type inventory.

[2] Some small lakes and ponds are classified as stream channels in the inventory.

Fish Management Indicator Species

National Forest Management Act regulations direct the use of Management Indicator Species (MIS) in forest planning to help display the effects of forest management. MIS are species whose population changes are believed to indicate the effects of land management activities. Through the use of MIS, the total number of species that occur within a planning area is reduced to a manageable set of species that represents, collectively, the complex of habitats, species, and associated management concerns.

For the Forest Plan Revision, pink salmon, coho salmon and Dolly Varden char were selected as MIS. (The selection process is discussed in the Wildlife Section of this chapter.) Dolly Varden char were selected to represent resident fish habitats; pink salmon to represent anadromous fish which are limited in their freshwater life-period by spawning gravel quality and quantity; and, coho salmon to represent anadromous fish that are generally limited in their freshwater life-period by stream and lake rearing area.

Fish Habitat Capability

Habitat capability is the carrying capacity: the maximum number of fish the habitat can produce. Population is the actual number of fish present at a given time. Populations tend to fluctuate due to a wide range of factors, including harvest, climate, and species interactions, while habitat capability tends to be relatively constant. Habitat capability, for anadromous fish, is measured in smolts (the life stage of a fish that migrates from freshwater to saltwater) and in numbers of adult fish for resident species (fish that remain in freshwaters their entire life). Smolts are the "final" output from National Forest system lands to the open ocean. The Forest Service has very little control of, or effect on, fish survival once the fish enter the ocean.

Estimates of habitat capability for each of the MIS occur in two steps. First, the potential habitat capability of Forest habitats is estimated. Second, estimates of the effects of management activities, such as timber harvest, on the potential habitat capability are made.

Capability models

Habitat capability models were developed for the three Management Indicator Species based on the channel type/stream class inventory. These models assume a relationship between fish habitat capability and stream physical characteristics (channel type). Streams located in the lower portions of a watershed typically have the highest capability. Mid-watershed channels generally have a lower capability, while the highest gradient channels in the upper portion of the watershed have the lowest productivity.

The capability models are somewhat different for pink salmon than for coho salmon and Dolly Varden char. The coho and Dolly Varden models are based on numbers of rearing (stream dwelling) fish, since these two species spend a number of years in streams. The pink salmon model is based on the availability of spawning gravels since these fish emerge from the stream gravels in the spring as smolts and immediately migrate downstream to the ocean. In each case, the life stage that is considered to be limiting the amount of habitat capability is used in the model.

Data used to develop these models came from all known reliable sources of information in Southeast Alaska, including studies by the Alaska Department of Fish and Game, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service and the U.S. Forest Service.

Table 3-24 shows the habitat capability predicted for the three management indicator species, by Administrative Area of the Tongass, as modeled for the natural habitat capability and with no human-related reductions or increases. (Model details are in USDA Forest Service, 1990.)

The habitat capability in 1954 is assumed to be the same as natural, since no large-scale timber harvest had previously occurred on the Tongass.

Table 3-24 shows that habitat capability for all species is greatest on the Chatham Administrative Area, followed by the Ketchikan Area and the Stikine Area. Total Forest-wide smolt habitat capability for pink salmon is approximately 2.4 billion smolt and for coho salmon 19 million smolt. For Dolly Varden char, the habitat capability is estimated at 68 million fish.

Review of the models by an interagency group of biologists indicated that the coho salmon model seemed accurate in estimating coho numbers, based on smolt migration studies. The pink salmon habitat capability model did not predict pink numbers as well as the coho model, as indicated by the distribution of commercial pink salmon harvest across Southeast Alaska. However, for pink salmon it was also acknowledged that harvest is disproportionately targeted in some areas, hatchery fish some years make up a large portion of the commercial harvest, and there tend to be very large fluctuations in pink salmon production because of the nature of the species. The Dolly Varden capability estimates seemed plausible to the reviewing group, however there is insufficient knowledge of the distributions of Dolly Varden populations to specifically assess the accuracy of the numbers.

Estimates of current habitat capability, that is, natural capability adjusted for past management effects (which includes habitat enhancement), are discussed in the following section.

Table 3-24

Natural (1954) habitat capability for pink and coho salmon, and Dolly Varden char

Administrative Area	Pink Salmon (M Smolts)	Coho Salmon (M Smolts)	Dolly Varden Char (M Fish)
Chatham	1,265,362	8,466	32,899
Stikine	520,144	5,088	14,213
Ketchikan	608,061	5,518	20,817
Total	**2,393,567**	**19,072**	**67,929**

Source: Habitat Capability Models (see Appendix B)

Modeling Effects of Past Management

The effects or impacts on the fish resources can be categorized into two parts: 1) the potential negative effects of management activities on fish habitat capability, and 2) the positive effects of habitat enhancement on the fisheries resource. Effects are primarily measured on the three fish Management Indicator Species. These effects are measured differently for pink salmon, which typically are spawning habitat limited species; and coho salmon and Dolly Varden char, which are typically freshwater rearing habitat limited.

Pink salmon. Pink salmon habitat capability relies on egg survival in the spawning gravels during egg incubation. A number of studies have shown a relationship between egg survival and water quality criteria, including intergravel fine sediments, temperature, waterflow, and other factors (reviewed in Reiser and Bjornn, 1979). Studies have been conducted of Southeast Alaska's pink salmon, including relationships between instream sediment, egg survival and pink salmon returns to streams (Sheridan, et al., 1984; Pella and Myren, 1974; Sheridan, 1982). None of the Southeast Alaska studies have provided a conclusive tie between upland (land not

immediately adjacent to streams) management and reduced numbers of returning fish. This may be due to the sensitivity of the biological investigations, or because the overriding factor limiting fish returns to Southeast Alaska's streams is ocean survival. Ocean survival is influenced by food, predators, offshore and nearshore harvests, climate, water temperature and other factors. Research models developed based on data collected since 1970 on Carnation Creek in British Columbia (Holtby and Scrivener, 1989) used to partition the variability in adult returns between the effects of climatic variability in the stream and the ocean, changes in stream conditions caused by logging, and variations in fishing mortality showed that: 1) most of the observed variation in adult numbers resulted from climatic variability in the stream and the ocean (in roughly equal measure); 2) variation of the fishing mortality over realistic ranges did not change variability in adult abundance, except at high exploitation rates where variability was increased; and, 3) coho salmon were unaffected by observed and simulated logging activity but chum salmon were adversely affected.

It is not clear how research results on effects of upland management on fish resources in studies outside of Alaska should be resolved with the information available from research studies in Alaska. Some studies outside of Alaska show a reduction in fish numbers resulting from certain types of upland management practices (Reiser and Bjornn, 1979), while others do not (Holtby and Scrivener, 1989). The studies inside Southeast Alaska have not shown a direct tie between upland management and fish numbers, therefore effects of past management activities on pink salmon are not quantitatively evaluated here. However, in a qualitative sense, with increased disturbance from land management activities, an increased risk of change to pink salmon habitat capability could be expected. The amount of land management disturbance, by geographic area of the Forest (Management Area), is included in the information presented in the section on environmental consequences.

Increases in the habitat capability for pink salmon have occurred through enhancement projects, such as fishways and spawning channels. Table 3-25 shows current (1988) pink salmon capability for the Forest resulting from naturally available habitat, plus the additional habitat resulting from the construction of fishways.

Table 3-25

Current (1988) capability estimates, adjusted for past enhancement & impacts

Administrative Area	Pink Salmon (M Smolts)	Coho Salmon (M Smolts)	Dolly Varden Char (M Fish)
Chatham	1,273,572	8,450	32,753
Stikine	551,060	5,151	14,077
Ketchikan	629,517	5,491	20,570
Total	**2,454,149**	**19,092**	**67,400**

Source: Habitat Capability Models (see Appendix B)

Comparison of Tables 3-24 and 3-25 shows an increase in pink salmon capability of approximately three percent between 1954 and 1988. The increase ranges from one percent on the Chatham Area (known to be an underestimate due to modeling considerations) to six percent on the Stikine Area. Since no negative impacts to pink salmon habitat capability are quantitatively predicted, only increased access to stream habitat due to construction of fishways is represented.

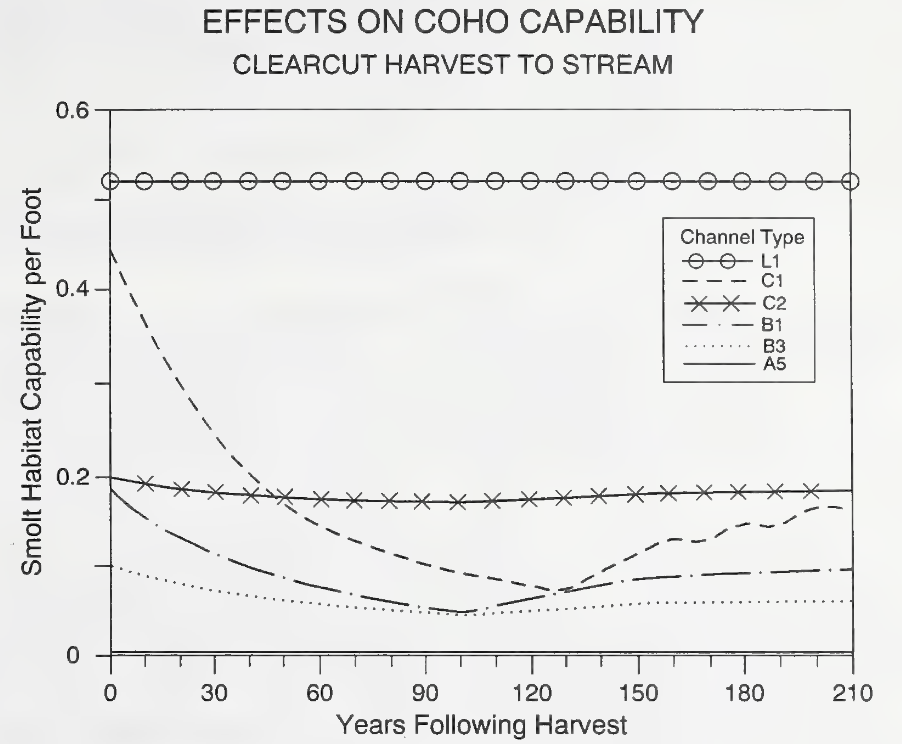
Coho salmon and Dolly Varden char. Coho salmon and Dolly Varden char habitat capability are dependent on the availability of suitable rearing area. Dolly Varden have two life strategies: some are anadromous fish, migrating to the sea for a portion of their lives; others live entirely in freshwaters. Dolly Varden, then, represent those species of fish which live in all types of stream habitat. On the other hand, coho salmon, a key public interest species, are for the most part only anadromous, residing in freshwaters for two to five years.

Murphy, et al. (1986) shows that for both coho and Dolly Varden, winter and summer survival is in large part a function of woody debris and pools. The presence of woody debris in riparian areas is the basis of habitat capability models developed by an interagency group including the National Marine Fisheries Service, the Alaska Department of Fish and Game, and the U.S, Fish and Wildlife Service. The capability models postulate that a key large woody debris piece, a piece large enough to hold all the smaller pieces in place for a given stream, is necessary. Another important model assumption is that the input of woody debris in the old-growth situation is equal to the output of woody debris due to decay, washout and any other loss (Murphy and Koski, 1989). (Further model details can be found in Appendix B and in the planning record.)

Effects on habitat capability for coho and Dolly Varden are modeled by identifying the number of key pieces of woody debris with no habitat disturbance, adding key pieces of large woody debris from second-growth sources, and subtracting losses of large woody debris due primarily to decay. Each channel type is modeled separately since each is dependent to a different degree on number and size of key pieces of debris.

To model the past effects of timber harvest on stream systems, it was assumed that clearcut timber harvest to the stream edge was predominant before 1979. The model assumes that woody debris already fallen in the stream is left in place following timber harvest activities. Figures 3-7 for coho and 3-8 for Dolly Varden show how habitat capability could be expected to change over time with clearcut harvest to the streambank in sample channel types. The changes in capability are calculated for each channel type over a period of 210 years.

Figure 3-7[1]

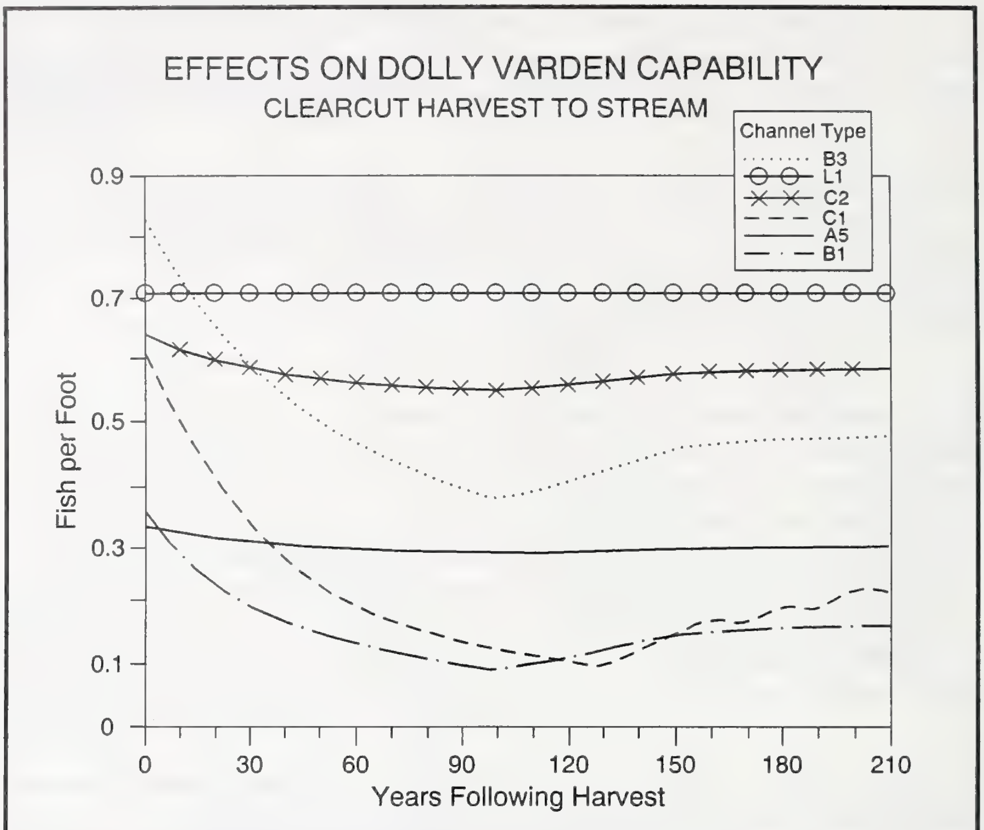


Source: Coho Habitat Capability Model (Appendix B)

[1]Outputs are in smolts per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities prior to 1979. Current management direction would result in no reduction in coho habitat capability. (For definitions of channel types, see Forest Plan Appendix D.)

These figures show that habitat capability differs significantly by channel type, and that streamside harvest results in dissimilar long-term effects on habitat capability. For instance, Figure 3-7 shows that coho habitat capability of channel types L1 (Placid/Glide process group) and C1 (Low Gradient Floodplain process group) are similar in old growth (shown as zero years following harvest). However, since the rearing capability for C1 streams is dependent on very large woody debris (key piece size greater than 36 inches in diameter), and the rearing capability for L1 channels is not dependent on large woody debris, following clearcut harvest there would be a large reduction in capability for C1 channels and no reduction in L1 channels.

Figure 3-8[1]



Source: Dolly Varden Habitat Capability Model (Appendix B)

[1]Outputs are in fish per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities prior to 1979. Current management direction would result in no reduction in Dolly Varden habitat capability.

The figures indicate that the maximum capability reduction following clearcut harvest occurs at approximately 90 to 130 years following streamside timber harvest. This corresponds to the period in which the input of second-growth large woody debris to a stream system is estimated to become greater than the decay of large woody debris existing in the stream prior to harvest.

The following two sections discuss the effects of buffers and cumulative effects on habitat capability for coho salmon and Dolly Varden char.

Buffers. Buffer strips along streams can be designed in a number of different ways depending on the management objective. Some buffer strips result in little or no reduction in fish habitat capability, while others may result in a capability loss. Some buffer strips may actually increase fish production during specific periods of the year. In large part, change in habitat capability depends on the management prescription applied in the riparian area. For instance, with a "100-foot no harvest" buffer strip, it is unlikely that any reduction in woody debris sources would occur since research shows that 100 percent of the woody debris originates from within 100 feet of the stream bank.

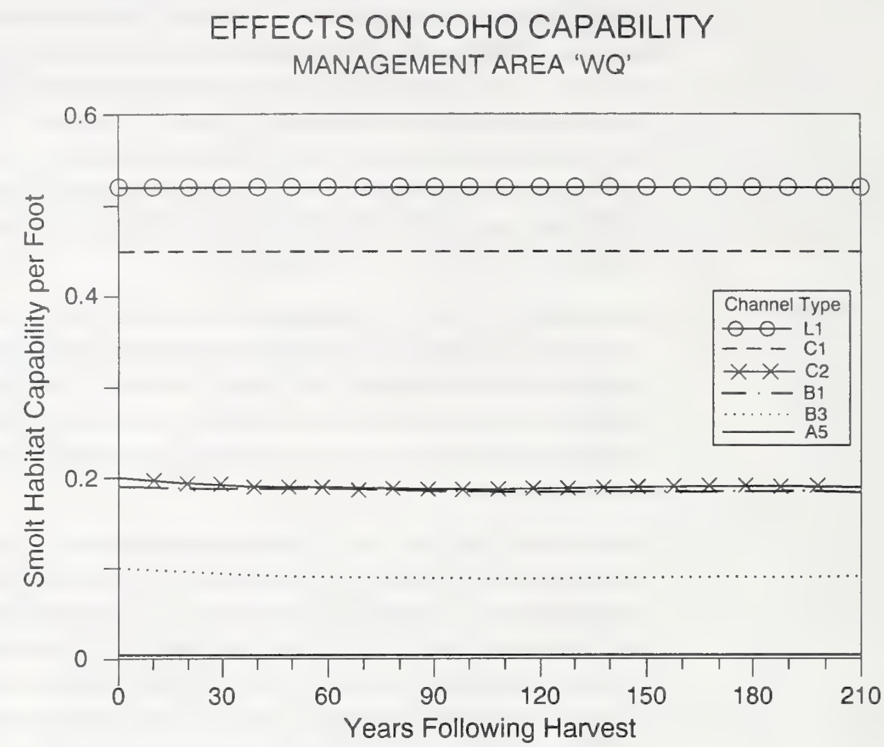
Two prescriptions for managing riparian areas were developed for the Draft Forest Plan revision (Revision DEIS, 1990). Following passage of the Tongass Timber Reform Act (TTRA) of 1990, these two prescriptions have been modified to be in compliance with Section 103 of TTRA. Section 103 of TTRA prohibits commercial timber harvest within a minimum of 100 feet either side of Class I streams and Class II streams which flow directly into Class I streams. The two prescriptions (land use designations) are: 1) Fish Habitat and Water Quality Requirements (abbreviation code WQ), and 2) Stream and Lake Protection (abbreviation code SL). The complete revised Stream and Lake Protection prescription is located in Chapter 3 of the Proposed Revised Forest Plan. The original prescriptions are located in Appendix F of the DEIS (Revision DEIS, 1990). The Fish Habitat and Water Requirements prescription is included as Appendix I of this Supplement.

The objective of the Fish Habitat and Water Quality Requirements land use designation is to comply with the National Forest Management Act Regulations of no serious and adverse effects to water conditions or fish habitat, while the objective of the Stream and Lake Protection land use designation is to maintain or improve aquatic biological productivity. Both of these prescriptions, as displayed in this Supplement, are designed to assure the protection of riparian habitat.

The effect on coho and Dolly Varden habitat capability following timber harvest is shown for sample channel types in Figures 3-9 through 3-11 for the Fish Habitat and Water Quality Requirements (WQ) Land Use Designation, as described in the prescription in the DEIS (Revision DEIS, 1990). Capability changes for Dolly Varden are shown for both Class I and Class II streams, since they would be differently managed. (Coho are only found in Class I streams.) For modeling purposes, the Fish Habitat and Water Quality Requirements prescription, as used in the DEIS (not this supplement), was used to represent management activities in riparian areas from 1979 to 1988. Additional information concerning the Stream and Lake Protection (SL) management prescription is located in the environmental consequences portion of the Fish section.

The WQ and SL management prescriptions emphasize the design of windfirm buffer areas, and the habitat capability models assume that no windthrow occurs other than natural events in old-growth forests. Natural levels may be very high, such as resulted from the windstorm on the Yakutat Forelands during the winter of 1980-1981. Although the effects of windthrow are not modeled, from knowledge of past activities, it is likely that some unplanned, or accelerated, windthrow will occur. Windthrown timber when left in the stream, continues to provide fish habitat associated with large woody debris. However, over the long term (50-150 years), some reduction in habitat capability may occur as the large woody debris decays. Any effects of accelerated windthrow associated with the riparian prescriptions generally occur only in areas that are managed for timber.

Figure 3-9[1]



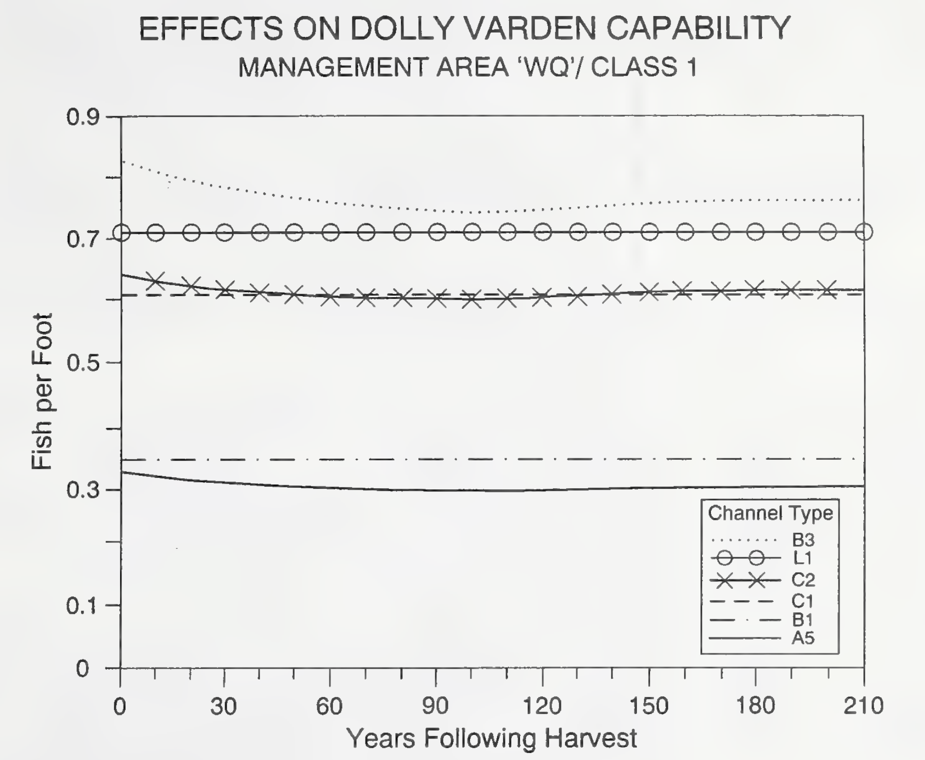
Source: Coho Habitat Capability Model (Appendix B)

[1]Outputs are in smolts per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities between 1979 and 1988. Current management direction is described in the Aquatic Habitat Management Handbook, FSH 2609.24, with additional direction provided by the Tongass Timber Reform Act. (For definitions of channel types, see Forest Plan Appendix D.)

Cumulative effects on habitat capability. Calculating the cumulative effects of past management activities on coho salmon and Dolly Varden char results in the capability estimates shown in Table 3-25 by Administrative Area.

The effects of clearcut harvest (Figures 3-7 and 3-8) are used in estimating the reduction in habitat capability from 1954 to 1979, since clearcut harvest to the streamside was often the common practice during those years. The effects of implementing the Fish Habitat and Water Quality Requirements Prescription (WQ) (Revision DEIS, 1990) are used to estimate the average reduction in capability that occurred from timber harvest practices during the period from 1979-1988. During the period 1979-1988, a combination of streamside leave-strip, selective and clearcut harvest prescriptions were used.

Figure 3-10[1]

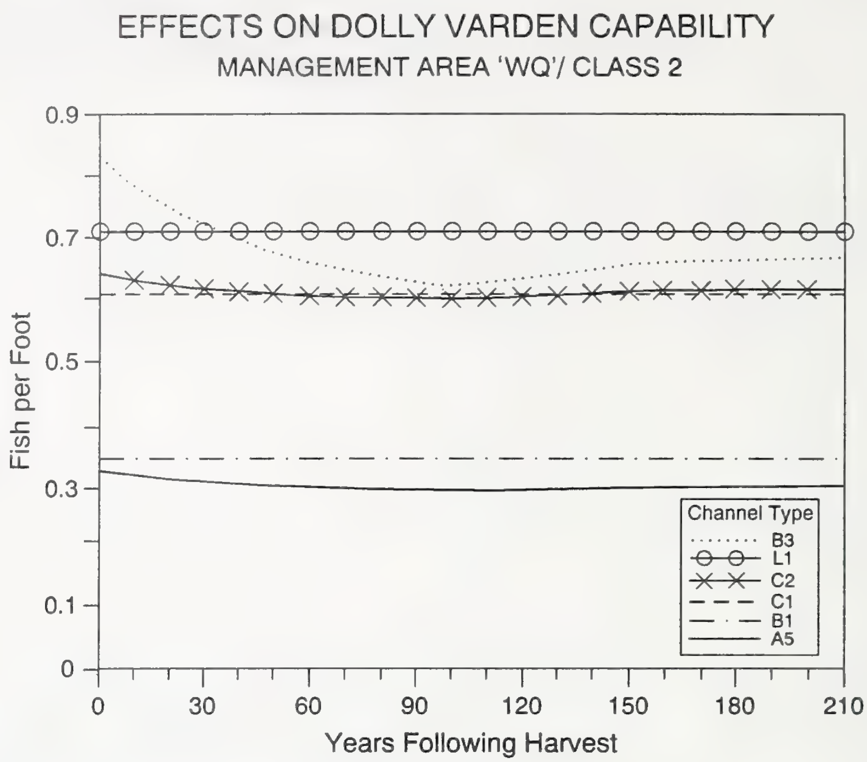


Source: Dolly Varden Habitat Capability Model (Appendix B)

[1]Outputs are in fish per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities between 1979 and 1988. Current management direction is described in the Aquatic Habitat Management Handbook, FSH 2609.24, with additional direction provided by the Tongass Timber Reform Act. (For definitions of channel types, see Forest Plan Appendix D.)

Table 3-26 compares 1988 data shown in Table 3-25 to the 1954 data shown in Table 3-24. Comparisons are in terms of 1954, since it was prior to the onset of large-scale industrial logging on the Tongass. The table also shows the benefits resulting from fishway construction. Table 3-26 shows that current Forest-wide coho salmon capability is estimated to be 100.1 percent of 1954's capability. Without the construction of fish ladders to access additional stream habitat, the current capability would be 99.3 percent of 1954's capability. The largest decrease in habitat capability, without enhancement, has been 1.4 percent on the Ketchikan Area. The largest percentage of coho fish passage enhancement has also occurred on the Ketchikan Area (.9 percent) followed by the Stikine (.7 percent) and Chatham (.2 percent) Areas.

Figure 3-11[1]



Source: Dolly Varden Habitat Capability Model (Appendix B)

[1]Outputs are in fish per foot of stream channel (for each channel type). This model was used to estimate the effects of timber harvest activities between 1979 and 1988. Current management direction is described in the Aquatic Habitat Management Handbook, FSH 2609.24, with additional direction provided by the Tongass Timber Reform Act. (For definitions of channel types, see Forest Plan Appendix D.)

Table 3-26 also shows estimates of capability changes for Dolly Varden char. Forest-wide, current Dolly Varden capability is 99.2 percent of the 1954 value. The greatest magnitude of change has occurred on the Ketchikan Area, followed by the Stikine and the Chatham Areas. These relationships result from the extensive timber harvest on portions of Prince of Wales Island between 1954 and 1979, and the vast acreages of unroaded and unharvested areas on the Chatham Area.

Table 3-26

Summary of habitat capability changes for Coho & Dolly Varden 1954-1988 (thousands of fish)

Specie[1]	Statistic	Chatham	Stikine	Ketchikan	Forest-wide
Coho	1954	8,466	5,088	5,518	19,072
Coho	1988 with no enhancement	8,432	5,063	5,441	18,936
	Percent of 1954	99.6%	99.5%	98.6%	99.3%
Coho	1988 with enhancement	8,450	5,151	5,491	19,092
	Percent of 1954	99.8%	101.2%	99.5%	100.1%
DV	1954 Capability	32,899	14,213	20,817	67,929
DV	1988 Capability	32,753	14,077	20,570	67,400
	Percent of 1954 capability	99.6%	99.0%	98.8%	99.2%

Source: Habitat Capability Models (see Appendix B)

[1]DV = Dolly Varden char

The changes due to timber harvest prior to 1988 will likely result in long-term future changes in habitat capability as depicted by the trends shown for individual channel types in Figures 3-7 through 3-11. Forest-wide, with no additional timber harvest or habitat enhancement projects, the maximum change predicted for coho salmon occurs in approximately the year 2075 and is less than a one percent reduction of the 1954 habitat capability. As the area of evaluation is reduced in size, changes in habitat capability become more pronounced. For instance, for the Administrative Areas of the Tongass, the maximum change ranges from a 1.5 percent reduction on the Ketchikan Area to a .8 percent increase on the Stikine Area. Smaller geographical areas have even greater potential changes. Without habitat restoration, northeast and southeast Chichagof Island, north Baranof Island, some of the small islands in the Stikine Administrative Area, and central Prince of Wales Island (Geozones C04, C06, C09, C10, K08 and S14 used in the Revision DEIS (1990)) could have more than a five percent reduction in habitat capability by the year 2075. The greatest reduction, 14.8 percent, is estimated for central Prince of Wales Island (Geozone K08 in the Revision DEIS). Many of the riparian areas in central Prince of Wales Island were clearcut harvested to the streambank during the 1960's and 1970's using techniques common during that period of time. Five geographical areas, north Chichagof Island, the Hyder Area, portions of Revillagigedo Island, Zarembo and Etolin Islands (Revision Geozones C02, K01, K04, S05 and S06), are predicted to have increases in habitat capability with the largest on Zarembo Island with 12.6 percent.

The models estimate that Dolly Varden char could decrease by about 1.5 percent from the 1954 level, Forest-wide, by the year 2075 with no further enhancement or timber harvest activities. The reduction ranges from 1.1 percent on the Chatham Administrative Area to 2.1 percent on

the Ketchikan Administrative Area. Decreases of more than five percent are predicted for southeast Chichagof Island, northeast Baranof Island, central Prince of Wales Island, the southeast mainland portion of the Stikine Administrative Area and some of the small islands on the Stikine Administrative Area (Geozones C06, C09, K08, S09 and S14 from the Revision DEIS (1990)). The greatest decrease of just over 10 percent is predicted for central portion of Prince of Wales Island (Geozone K08).

The model calculations represent one aspect of the effects of land management activities on coho and Dolly Varden habitat capability: pools formed by large woody debris.

Other factors

Other environmental factors resulting from management activities may also affect habitat capability for the management indicator species. Some of these factors are included in the following discussion. However, as described previously, research models developed based on data collected since 1970 on Carnation Creek in British Columbia (Holtby and Scrivener, 1989) used to partition the variability in adult returns between the effects of climatic variability in the stream and the ocean, changes in stream conditions caused by logging, and variations in fishing mortality showed that: 1) most of the observed variation in adult numbers resulted from climatic variability in the stream and the ocean (in roughly equal measure); 2) variation of the fishing mortality over realistic ranges did not change variability in adult abundance, except at high exploitation rates where variability was increased; and, 3) coho salmon were unaffected by observed and simulated logging activity. Therefore, although these factors may have some influence on the overall habitat capability, on a Forest-wide basis it is not anticipated to be significant.

Temperature. Summer high and winter low water temperatures influence fish survival and condition. Water temperature affects the metabolic rate of aquatic organisms and can affect the migration timing of adult and juvenile fish. Small changes in water temperatures can affect emergence of fry from the gravels and have a fairly large effect on eventual adult survival (Holtby and Scrivener, 1989). Harvest of streamside vegetation, as well as the total amount of harvest in a watershed, can affect water temperature.

Some stream systems are particularly sensitive to high temperatures, including slow-flowing streams with southerly aspects, and streams with shallow lake and muskeg sources. Timber harvest to the streambank is suspected of raising stream temperatures to a level which may contribute to adult fish kills. Data has been compiled by the Alaska Working Group on Cooperative Forestry/Fisheries (Gibbons, 1989) on all known instances of fish kills in Southeast Alaska. The data indicates that fish kills have occurred in both logged and unlogged areas. Further identification of the relationships between fish kills, factors causing these fish kills (i.e., environmental conditions such as temperature, long periods of reduced rainfall, numbers of returning salmon, dissolved oxygen content, tidal flow and watershed characteristics), and the relationship to timber harvest practices is under review by the Alaska Working Group on Cooperative Forestry/Fisheries.

The first phase of the identification of the reasons for fish kills was conducted during the summer of 1990 on seven streams on Prince of Wales Island, under the direction of the Alaska Working Group on Cooperative Forestry/Fisheries Research (Pentec Environmental, Inc., 1991). The research was designed to address the physical in-stream reasons for adult fish kills (also known as pre-spawner mortality). Although no actual fish kills were observed, the conclusions of this study were:

1. Fish respiration by adult spawners can cause significant reductions of dissolved oxygen concentration during summer low flows;
2. Dissolved oxygen reductions caused by fish respiration can occur at water temperatures well below lethal levels;
3. Stream discharge and spawner abundance were the primary factors controlling dissolved oxygen levels during the spawner migration period in the study streams; however, the analysis indicates that fish activity levels could also be important;
4. Low dissolved oxygen concentration as a result of fish respiration in fish holding pools is the most likely factor causing salmon pre-spawner mortality; and,
5. An increase in water temperature will decrease the potential availability of dissolved oxygen and increase dissolved oxygen uptake by fish, but the effects of these factors on dissolved oxygen concentration are dependent on stream discharge.

Low winter temperatures can lead to detrimental winter stream conditions, such as anchor ice formation and freezing of spawning gravels. Pool size is reduced with surface and anchor size. Low temperatures may be aggravated by streamside vegetation canopy removal, but estimating the effects are very difficult due to the influences of intermittent snow or ice cover and high variability in winter air temperature, wind and precipitation patterns commonly found in Southeast Alaska. Identification of temperature-sensitive streams, and watersheds requiring special management due to temperature considerations, can only occur during site-specific project planning.

Fish passage and roads. Fish passage is the ability of both adult and rearing fish to move both up and down stream. For adults, movement is often to the spawning gravels. In rearing fish, movement is to seek suitable, seasonally-required habitat. Stream crossings by roads have the potential to reduce movement of fish. Stream crossing standards and guidelines require fish passage, where needed; however, in some cases, primarily on small resident fish streams, management decisions may be to not provide fish passage. In the past, stream road crossings have been designed for fish passage, but following construction fish passage has been restricted. Each of these known sites has been, or is being, redesigned for fish passage. In addition, there are some stream road crossings which originally were not designed for fish passage, but are now being reconstructed to allow passage (personal communications with Area Fish Biologists, 1991).

Marine systems. A number of activities on National Forest System lands indirectly affect marine systems, estuaries, and their productivity. The primary activities include log transfer and storage sites. These activities require State Tidelands permits and U.S. Army Corps of Engineers permits and the activities must be consistent with coastal zone management policies to the maximum extent practicable. For further information on log storage and transfer and their effects, see the Transportation section of this document. (References: Sedell and Duval, 1985; Robinson-Wilson and Jackson, undated - approximately 1986; Faris and Vaughan, 1985.)

Summary

The Tongass Land Management Plan Environmental Impact Statement (1979, p. 92) described a goal for fish resources on the Tongass National Forest to "preserve the biological productivity of every fish stream on the Tongass." Forest-wide, management has, for the most part, met the goal. Cumulatively, across the Forest since 1954, there has been an estimated reduction in habitat capability of less than one percent for coho salmon and Dolly Varden char, and a three percent increase in habitat capability for pink salmon. However, in specific geographical areas, such as on portions of Prince of Wales Island, habitat capability has been, and likely will be, reduced (from 1954, currently a 10 percent reduction and a 15 percent reduction could occur by

the year 2075). Factors represented in these changes include decreases in habitat capability for coho and Dolly Varden due to streamside timber harvest of large woody debris sources and increases in available habitat due to the construction of additional fish access. Other factors may affect habitat capability for all three species, but quantifying these effects (such as temperature and watershed disturbance), on a Forest-wide basis, would be very difficult to do based on the data and research available.

Demand

In all public scoping, a common advocacy of the public is the maintenance or improvement of fish habitat values. Demand from the public for subsistence, commercial and sport harvested fish remains very high. Demand for subsistence fish is discussed in the Subsistence section of this chapter, while commercial and sport fish demand are reviewed in this section. The commercial fish demand is based on goals set by Regional Salmon Planning Teams. Sport fish demand is estimated by projecting past use trends into the future.

Commercial fish. Demand for commercial fish is difficult to quantify since it depends on numerous factors, including price, international markets, and numbers of participants in the fisheries. However, in order to quantify reasonable production goals, Regional Salmon Planning Teams set targets for fish production for the year 2000 (Alaska Department of Fish and Game, 1984; Joint Southeast Alaska Regional Planning Teams, 1981; Northern Southeast Regional Planning Team, 1982-present; Southern Southeast Regional Planning Team, 1983-present). The salmon production goals can be used as an indication of the demand for commercial fish on the Tongass. They represent what is thought to be a realistic and attainable goal in the rehabilitation of Southeast Alaska's salmon harvests.

The difference between the salmon production goals for future harvests and current harvests are referred to as the GAP, and are shown in Table 3-27 and Figure 3-12. The GAP is calculated for all five species of commercially harvested salmon.

The Regional Comprehensive Salmon Plan for Southeast Alaska, excluding Yakutat, defines GAP as the difference between the Present Potential Harvest (the harvest possible when all current management strategies are at their full capacity of salmon production) and the Planned Harvest Objective (the harvest level needed to return runs of salmon to levels recorded at the turn of the century). The GAP for Yakutat is the difference between the Planned Harvest Objective minus the Present Harvest (current average harvest, not including the power troll fisheries). National Forest habitats are estimated to contribute approximately 80 percent of the fisheries in Southeast Alaska represented by the present harvests, year 2000 goals and the GAP.

Table 3-27 and Figure 3-12 show that for Southeast Alaska king salmon production is at approximately the goal set for the year 2000. All other salmon species are between 58 and 61 percent of their year 2000 production goal. Some of the GAP in production will come from habitats, hatcheries, and other facilities not located on the National Forest or result from investments other than by the Forest Service.

Table 3-27

Gaps in year 2000 fish production for Southeast Alaska (number of fish)[1]

	Present Harvest[2]	Year 2000 Goals[3]	GAP	Percent[4]
King Salmon	494,663	544,000	49,337	91
Coho Salmon	1,710,043	2,825,000	1,114,957	61
Sockeye Salmon	1,343,618	2,325,000	981,382	58
Pink Salmon	17,394,080	30,150,000	12,755,920	58
Chum Salmon	5,703,535	9,713,000	4,009,465	59

Sources: Joint Southeast Alaska Regional Planning Teams, 1981; Alaska Department of Fish and Game, 1984; Northern Southeast Regional Planning Team, 1982-present; Southern Southeast Regional Planning Team, 1983-present; Alaska Department of Fish and Game, 1989 (1988 Finfish Fisheries Regional Information Report)

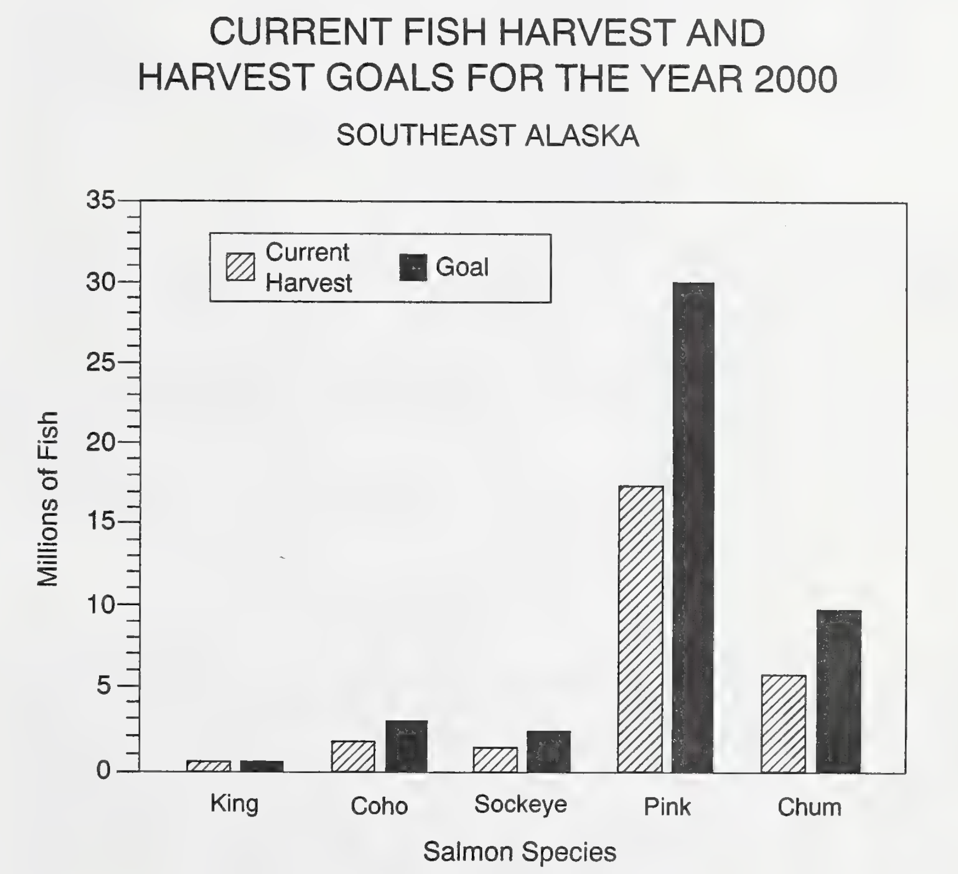
[1] See text and the following notes.

[2] Present harvest represents the following: For Yakutat, average of the set gill net fishery from 1984 to 1988. For Southeast Alaska, excluding Yakutat, the current potential harvest if all habitat, improvement projects, and aquaculture facilities were producing fish to their maximum capability. Current harvests are generally not equal to the present potential harvest.

[3] As established by the Regional Planning Teams for Northern and Southern Southeast and Yakutat.

[4] The present potential harvest, as a percentage of the planned harvest objective.

Figure 3-12

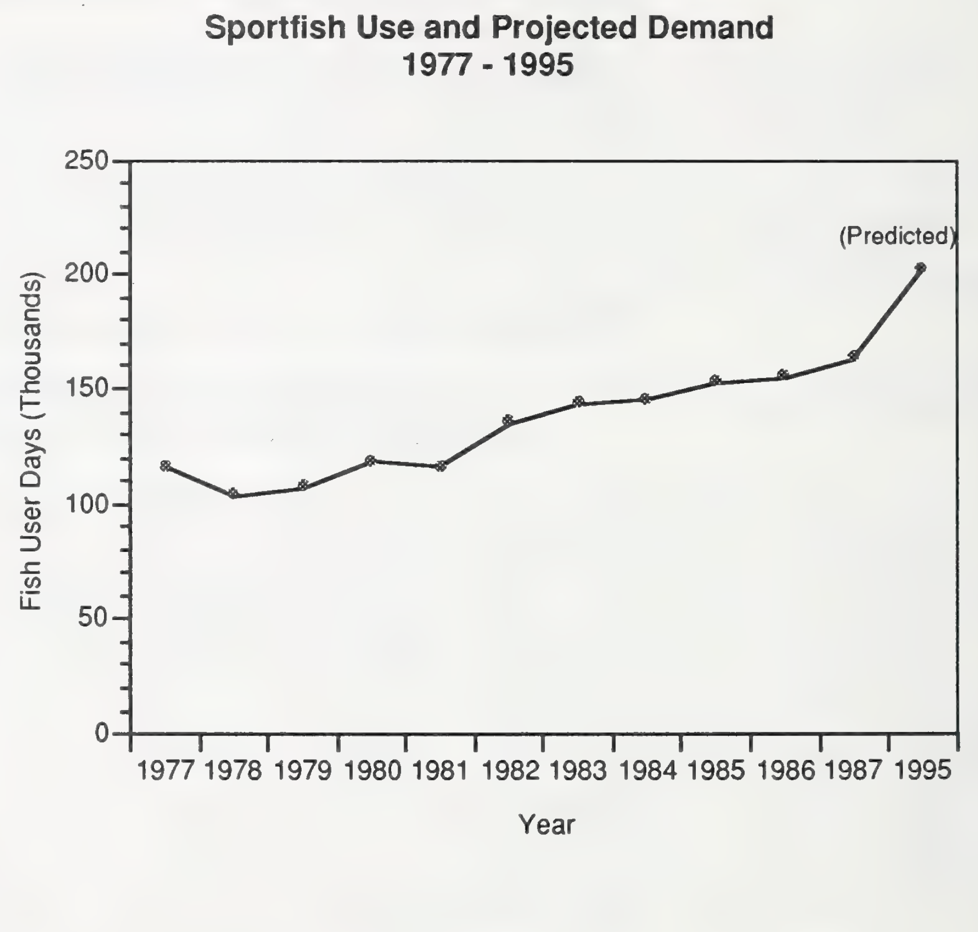


Source: Table 3- 27

Sport fish. Sport fish demand is calculated using past sport fishing use and projecting population changes from the locations where the sport fish demand is generated. Data for current use and origin of that use was obtained from Mills (1989) and Mills (personal communication., 1989). Current use, and anticipated future demand are shown in Figure 3-13.

Sport fish use is almost always a very small portion of the total anadromous fish harvest. The majority (usually as great as 95 percent) of the harvest is commercial fish. As the demand for sport fish increases, allocation changes of fish resources may be required. These changes would occur through actions of the Alaska Department of Fish and Game, the Board of Fisheries and the Alaska State Legislature.

Figure 3-13



Sources: Mills, 1987
Personal communications with Mark Schawn and M. Mills (ADF&G, 1989)
Appendix B

Contribution of the Tongass. Comparison of current harvest and the goals for fish production in Southeast Alaska indicates that harvest is at approximately the target set by the Regional Salmon Planning Teams for king salmon, and approximately 40 percent below the targets for the other species of salmon.

Table 3-28 compares the estimated habitat capability of the Forest, the goals for production set for the year 2000 by the Regional Salmon Planning Teams, and the current harvest. The Forest is estimated to be capable of producing commercial harvests totaling approximately 110 million pounds. Consideration of Southeast Alaska's hatchery contribution is important to the statistics in Table 3-28. Hatcheries supply a portion of the current harvest, and are expected to supply a considerable portion of the year 2000 goals. Hatcheries are not included in the estimated National Forest habitat capability.

In order to attain the year 2000 goals, a combinations of strategies will be necessary, including enhancement on National Forest system lands. Other strategies may include the construction or expansion of hatcheries, construction of enhancement projects on non-Federal lands, changes in fishery management, or other, as yet undetermined enhancement methods (reviewed in the Regional Salmon Enhancement Plans).

Table 3-28

Estimated harvest, capability and year 2000 goals for the Tongass National Forest (in thousands of pounds)

	Estimated Current Harvest[1]	Estimated Capability[2]	Year 2000 Goals[3]
King Salmon	3,810	7,259	6,920
Coho Salmon	10,874	10,475	14,322
Sockeye Salmon	6,404	7,589	14,012
Pink Salmon	70,772	57,703	79,596
Chum Salmon	14,414	27,581	70,711
Total	**106,274**	**110,607**	**185,561**

Sources: Joint Southeast Alaska Regional Planning Teams, 1981; Alaska Department of Fish and Game, 1984; Northern Southeast Regional Planning Team, 1982-present; Southern Southeast Regional Planning Team, 1983-present; Alaska Department of Fish and Game, 1989 (1988 Finfish Fisheries Regional Information Report); Habitat Capability Models (see Appendix B)

[1] Commercial fish harvest from Southeast Alaska, averaged for 1978-1987, multiplied by a factor of .8 to represent National Forest habitats. These figures include production from hatcheries.

[2] Estimated capability of National Forest habitats to produce salmon. This does not include production from hatcheries.

[3] Goals for the year 2000 as developed by the Regional Planning Teams and multiplied by a factor of .8 to represent National Forest habitats. These figures also include production from hatcheries.

Opportunities

There are opportunities in the Revision of the Tongass Land Management Plan to address fish habitat and production in a number of different ways. Options for habitat management include maintaining the status quo, allowing slight additional reductions in fish habitat capability, and providing for considerable increases in fish production. Some members of the public (Tongass Land Management Plan Revision Scoping Data base, 1988), as well as Federal agencies (National Marine Fisheries Service, 1988), requested "no-harvest" buffer strips along all streams (some advocated no harvest along all anadromous fish streams, some along any fish

streams, and others along all streams with or without fish). Recent passage of the Tongass Timber Reform Act has addressed these concerns. The Act states that there shall be no commercial timber harvest within a minimum of 100 feet each side of Class I streams and of Class II streams which flow directly into Class I streams. However, with the Revision, there remains the opportunity to further reduce the risk of effects to streamside areas by allocating other Class II and Class III stream to no harvest, and to extend the no-harvest areas to beyond 100 feet from the streams.

Increases in fish production would result from maintaining currently existing habitat, combined with rehabilitation or restoration of previously impacted areas and the development of fish enhancement projects. A preliminary listing of potential fish enhancement projects has been made. Table 3-29 displays these preliminary opportunities by Administrative Area of the Tongass.

Table 3-29

Potential thousand of harvestable pounds of salmon resulting from first decade fish enhancement[1] (thousands of pounds)

Decade	Chatham	Stikine	Ketchikan	Total
1	1,732	318	2,626	**4,676**
2	2,146	874	15,208	**18,228**
3	1,779	804	17,360	**19,943**
4	1,579	372	14,816	**16,767**
5	431	317	11,851	**12,559**

Source: List of potential projects developed by the Administrative Area Fish Biologists, 1991.

[1] Thousands of pounds available for commercial harvest. The fish may also be harvested in the subsistence or sport fisheries.

Table 3-29 indicates that approximately 6.5 million pounds of salmon enhancement could be feasible during the first ten years of implementation of the Revised Tongass Land Management Plan. Salmon are available to the subsistence, commercial and sport fisheries. Typically, full project capability takes from 5-20 years to be achieved, depending on the type of project. Therefore, the maximum benefit of the projects implemented in the first ten years is actually attained in the third decade. Approximately 19 million pounds of salmon enhancement, available to the commercial fishery, should be available in the third decade.

A number of caveats are attached to these estimates: 1) although these are the current best estimates, most of the projects will require ground verification; 2) the projects will have to be cleared through a site-specific environmental analysis; 3) some projects may be better classified as rehabilitation rather than enhancement; and 4) only theoretically are these numbers of fish available to the commercial fishery — there are many other factors limiting the actual harvest, such as off-shore survival.

The identified projects include proposals for enhancement in Wilderness Areas. The construction of projects in Wilderness, although specifically allowed in Section 1315 of ANILCA, has been controversial. Forest Service direction is that comparable projects should be implemented outside of Wilderness rather than within Wilderness. These projects will receive further review prior to the completion of the Final Revised Plan, and their implementation.

Methodology and Scientific Accuracy

Channel type inventories. Channel types form the basic framework for determining the number of miles of streams on the Forest and for fish habitat capability models developed for the Tongass National Forest planning process. The channel type classification describes stream ecosystems found throughout the Forest. Channel types are distinguishable channel segments that have relatively similar physical attributes. This classification groups channels into categories using attributes such as stream gradient, width, stream substrate, stream bank control, channel containment and channel incision depth. Channel type mapping units have been described, mapped, and sampled for the majority of the Tongass National Forest. Mapping units are first delineated on 4 inch to the mile air photos. Photo mapping is then transferred to 2 inch to the mile orthophoto, topographic base maps. A portion of these channel types are then verified using low level air reconnaissance and ground truthing before they are considered as final mapped (Paustian, 1984; Marion, 1983). In addition to verifying photo mapping accuracy, field crews sampled numerous channel reaches for physical habitat characteristics. The channel type mapping and associated attribute data has been incorporated into a Geographic Information System (GIS) being used for the Forest Plan Revision.

The entire Tongass National Forest, except for several Wilderness areas, has been inventoried for channel type. Some wilderness areas have not been inventoried. In addition, some streams have been missed from the inventories, and can only be identified during on-the-ground intensive survey. An estimate of streams not inventoried inside of wilderness, as well as streams missed from the inventories has been made and is represented in the estimates of stream habitat.

For estimating stream miles in uninventoried Wilderness, geographical areas with completed channel typing and with similar landforms to uninventoried Wilderness areas were identified. The number of miles of streams in Wilderness, based on the number in similar areas, were then prorated on an acre for acre basis. Table 3-30 indicates how each of the wilderness areas have been assigned stream mile estimates: Note: the comparisons shown are based on geozones, or geographic zones, as used in the DEIS (Revision DEIS, 1990).

Table 3-30

Methods of assigning stream miles in Wilderness Areas[1]

Geozone	Wilderness Name	Method of assigning production
C03	West Chichagof-Yakobi	C11 used as substitute
C12	West Chichagof-Yakobi	C05 used as substitute
C13	South Baranof	C11 used as substitute
C14	Tracy Arm-Fords Terror	C23 used as substitute[2]
C15	Admiralty Island	C06 used as substitute
C16	Endicott River	inventory complete
C17	Russell Fiord	inventory complete
S11	Tebenkof Bay	inventory complete
S12	Stikine-LeConte	inventory complete
S13	Petersburg Creek-Duncan Salt Chuck	inventory complete
K13	Misty Fiords	about 1/3 complete; expand with completed area
K14	South Prince of Wales	K08 used as substitute
K15	Coronation-Maurelle-Warren	K10 used as substitute

[1] Streams in wilderness areas created by the Tongass Timber Reform Act of 1990 have been inventoried for channel type.

[2] S08 could be a more appropriate geozone, however C23 is similar and was chosen because of its location within the same administrative area.

The identification of which comparable geozone should be used was done by Steve Paustian (Chatham Area Hydrologist) and John Edgington (Alaska Department of Fish and Game, Petersburg) during the week of October 23-27, 1989. Summaries of the channel types found in each of the geozones with completed inventories were used to assist the analysis of comparable geozones.

Completion of channel typing throughout the wilderness areas on the Tongass would allow a more precise estimate of the true number of miles of stream on the Tongass.

Inventory of the channel types results in an underestimation of the true number of miles of streams. This is because at the extensive level of this inventory, all streams cannot be observed on aerial photography or at the level of detail with which the inventory is verified. A test was made on each of the administrative areas of the Tongass to estimate the number of miles missing from the channel type inventory. These tests involved hydrologists walking transects on the ground and observing the number, channel type, and length of missing channels. Based on these tests, the following channel types lengths have been adjusted in the inventory (multiply the lengths of the channel types by the factor shown): A1 - 1.10; A4 -1.91; A5 - 1.10; A6 - 1.10; A7 - 2.22; B1 - 1.35; B2 - 1.60; B4 - 1.28; B5 - 1.33. As project work in localized area occurs, intensive inventory of channel types will correct the extensive level of inventory on which the Forest Plan data is based.

Lake area. Lake acreages have been inventoried in four separate and different inventories. These include timber type, soils, watersheds and land status. Table 3-31 shows some of the characteristics of each of the inventories. All the inventories are located in the computerized Geographical Information System data bases being used for the Revision, however the land status inventory does not reside in the GRID data base used for fish model formulation. Without land status lakes in the GRID, it is not possible to query this inventory for certain attributes, such as elevation and location within a geographic area.

The design of each inventory included a minimum resolution size. Often, lakes were delineated to a higher degree of accuracy, that is to a smaller lake size, than called for in the inventory in general. Of the only two inventories that can be comparably related because they were completed across the entire Forest, timber type and land status, there are a total of 288,093 acres of lake in the land status inventory and 268,048 acres in the timber type inventory. This represents about 1.6 percent of the land area on the Tongass. These acreages indicate that for one inventory, land status includes the most complete sampling of lakes. However, since land status is not available in the GRID, the next best alternative is needed for modeling purposes.

Timber type often includes lake surfaces mapped to a two-acre resolution. It has needed attributes, including that it has been mapped in wilderness and data is located in the GRID. Although watershed mapped lakes are often the most detailed of the inventories, it is limited for two reasons: no watershed lakes have generally not been identified in wilderness and only those lakes which are located on streams are included in the inventory.

Because of the limitations and accuracy of the data (see Table 3-31), timber-type lakes were used as the source for numbers of lakes and their size for purposes of lake statistics and in developing quantified amount of fish habitat. The rationale for using the timber-type lakes is that: 1) it includes wilderness mapping; 2) it is available in the GRID; 3) timber type has been mapped in all areas, not only on those with stream inlet and outlets, and 4) the mapping detail is to at least five acres, and often to two acres. Using combinations of the different inventories to represent lakes was found to be infeasible.

Table 3-31

Comparison of different inventories for the purposes of establishing lake acres

Inventory	Wilderness Mapping	Minimum Lake Size in Inventory (in acres)	Lakes Inventoried	Data in GIS[1]	Data in GRID[2]
Timber Type	yes	5[3]	all lakes	yes	yes
Soils	no	10[3]	all lakes	yes	yes
Watersheds	no	mappable at 1"=1 mile (usually 2-5 acres)	only lakes on streams	yes	yes
Land Status	yes	inspection shows 1 acre	all lakes	yes	no

[1] GIS = Geographic Information System data base.

[2] GRID = Forest planning data base associated with Plan analysis.

[3] Often, lakes as small as 2 acres in size are inventoried.

Enhancement projects. The number of fish projects completed during the last ten years, and estimates of fish production were provided, by the Regional Forester's office for the Alaska Region 10. They were based on an annual accounting of projects completed, as well as estimates by fish biologists of the potential production from the projects. The estimates are best professional estimates based on coefficients developed to assess the potential benefits of various types of projects. The coefficients were developed by fish biologists in the Regional Office. The precision of use of the coefficients is high, however the precision of the estimate, as directly measured, is low because of incomplete monitoring of each individual project.

Habitat capability estimates. Habitat capability models were developed for the three Management Indicator Species. The models that were developed are based on the channel type/stream class inventory. These models assume a relationship between fish habitat capability and stream physical characteristics (channel type). Details of the methodology and certainty of the results are included in previous sections.

An alternate habitat capability model for pink, chum, and coho salmon has recently been developed for *SAMM: A Prototype Southeast Alaska Multiresource Model* (Fight, et al., 1990). The fisheries submodel in SAMM was not used for predicting the effects of habitat management on fish because:

1. The fisheries submodel requires outputs from many other models in SAMM, including information about amount of logging, miles of road used and constructed, area logged, total sediment load, bedload shift, stream temperatures, flows, stream velocity and canopy cover. Because of the way the model was designed, considerable information about an individual stream system and all activities planned in the stream area must be known to use the model. The model was designed to be used on a project-specific area, not on a Forest-wide basis.

2. Changes in pink salmon numbers are primarily due to logging and road construction and use. There is no empirical evidence in Southeast Alaska that pink salmon have responded to logging and road construction as depicted in the model. This could result, among other reasons, from the high natural variability in sediment flushing rates from Southeast Alaska streams. See the Water section and other parts of the Fish section of this chapter for more information. (Note: The basis for the coho and Dolly Varden models used in this Environmental Impact Statement analysis was in part from the fisheries submodel in SAMM.)

Demand for fish. Demand was established differently for the three major types of fisheries: sport fish, subsistence and commercial fish. Commercial fish demand is based on goals set by Regional Salmon Planning Teams. Sport fish and subsistence demand are estimated by projecting past use trends into the future.

Commercial. The salmon production goals set by the Regional Salmon Planning Teams have been used as an indicator of the demand for commercial fish on the Tongass. The goals represent what is thought to be a realistic and attainable goal in the rehabilitation of Southeast Alaska's salmon harvests. The goals are based on public input, as well as records of past commercial fish harvests. However, these goals do not take into account a rigorous analysis of price, supply and demand, as well as competition with other markets and sources of anadromous salmon. In addition, demand as well as harvest of salmon on the Tongass is assumed to be about 80 percent of the total harvest in Southeast Alaska. This is an oversimplification, since harvests and production vary by species, and by the component of the harvest that may be attributable to hatcheries.

Sport fish. Demand was calculated for sport fish by using past sport fishing use and projecting population changes from the locations where the sport fish demand is generated. Data for current use and origin of that use was obtained from Michael J. Mills (Alaska Department of Fish and Game, 1989). Populations of people in locations where the sport fish demand is generated, as well as the number of people interested in sport fishing, is assumed to increase in a similar manner as it has in the past (for the years of this analysis). (See also Appendix B.) In all likelihood, there will be some change in the overall trends of sport fishing, but this cannot be anticipated for the long term.

Subsistence fish. Subsistence demand is further discussed in the section of the DEIS on subsistence.

Potential fish enhancement projects. Increases in fish production could result from the development of fish enhancement projects. A listing of potential fish enhancement projects has been made by fish biologists on each District and Area Office of the Tongass, as well as their anticipated estimated potential contribution to the fisheries. A number of caveats are attached to these estimates: 1) most of the projects have not been ground checked; 2) the projects have not received site-specific environmental analysis; and 3) only theoretically are these numbers of fish available to the commercial fishery — there are many other factors limiting the actual harvest, such as off-shore survival. Monitoring of past projects has contributed to estimates of potential project outputs, and monitoring of new projects will contribute to the information base on which to design additional projects. The identified projects include proposals for enhancement in wilderness areas. The construction of projects in wilderness, although specifically allowed in Section 1315 of ANILCA, has been controversial.

Mitigation. Various guidelines and methodologies are used to reduce or eliminate the effects of management activities on the fish resource. The primary methods are Best Management Practices and the application of standards and guidelines associated with streams and watersheds. Best Management Practices, which are applied in the 1979 Plan, as well as in the proposed revised Plan, are discussed below. The application of standards and guidelines, for this Plan, is covered in the environmental consequences section.

Best Management Practices. Best Management Practices (BMP's) are methods, measures or practices to prevent or reduce water pollution. They include structural and nonstructural controls, operation and maintenance procedures, and scheduling and distribution of activities. Usually BMP's are applied as a combination of practices, rather than a single practice.

The BMP's presented in the Best Management Handbook (FSH 2509.22, USDA Forest Service, 1991) were compiled from Federal Law, Forest Service manuals, handbooks, contract and permit provisions, policy statements, planning documents, regional guides, applicable state and local law and regulations and other pertinent sources. The site-specific application of these BMP's is conducted in an interdisciplinary mode, and involves consideration of: design standards and risks, environmental effects, practicality, and institutional, political, social, economic, and technical feasibility.

These BMP's are of three basic forms, (administrative, preventive and corrective) and are required on all projects which could potentially degrade water quality. BMP's establish a procedure which will result in the formulation of site-specific prescriptions for nonpoint source pollution control. BMP applications vary for different situations. No single practice, method, or technique is best in all circumstances. BMP's presented in this handbook include qualifiers as "according to design," "as prescribed," "suitable for," and "within acceptable limits." BMP applications are developed by professional personnel through interdisciplinary involvement. These applications are tailored to meet local resource and environmental requirements.

The environmental and technical aspects of site-specific application of BMP's follow widely accepted scientific principles. These principles are applied using the benefit of experience (both local and collective knowledge). In addition part of the BMP's process is monitoring and refinement. The refinement process tests the validity of applying the various scientific principles to differing environmental and management conditions and improves our local and collective knowledge base.

Fish

Environmental Consequences

Legislation, Regulations and Current Direction

The National Forest Management Act sets the minimum standard for fish habitat protection on all of the National Forests, while the recently enacted Tongass Timber Reform Act provides specific direction for fish and riparian protection for the Tongass National Forest.

The National Forest Management Act (36 CFR 219.27(e)) states, in part:

> No management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment shall be permitted within these areas (riparian areas) which seriously and adversely affect water conditions or fish habitat (parenthetical words added).

In essence, the National Forest Management Act requires that no serious and adverse effect occurs to fish habitat.

The Tongass Timber Reform Act, passed in 1990, provides direction for fisheries protection in section 103(a). The Act reads:

> SEC. 103. FISHERIES PROTECTION.
>
> (a) Section 705 (16 U.S.C. 539d) of ANILCA is amended by adding at the end thereof the following new subsection: "(e) In order to assure protection of riparian habitat, the Secretary shall maintain a buffer zone of no less than one hundred feet in width on each side of all Class I streams in the Tongass National Forest, and on those Class II streams which flow directly into a Class I stream, within which commercial timber harvesting shall be prohibited, except where independent national forest timber sales have already been sold ..... The Secretary shall use best management practices, as defined in the Region 10 Soil and Water Conservation Handbook (FSH 2509.22), January 1990, to assure the protection of riparian habitat on streams or portions of streams not protected by such buffer zones. For the purposes of this subsection, the terms 'Class I streams' and 'Class II streams' means the same as they do in the Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986."

The objective of this section is to assure the protection of riparian habitat and to protect fisheries through the application of buffer zones not less than one hundred feet in width and through the application of best management practices.

The fisheries protection standard set for the Tongass National Forest in the Southeast Alaska Area Guide (USDA Forest Service, 1977, p. 79) and paraphrased in the Tongass Land Management Plan Environmental Impact Statement (USDA Forest Service, 1979, p. 92) is to, "preserve the biological productivity of every fish stream on the Tongass." For this revision of the Tongass Land Management Plan, the goal of preserving the biological productivity of fish streams on the Tongass is a common goal of all of the alternatives.

The following sections describe the strategies to attain this goal, the requirements of the Acts and legislation described above, and an evaluation of the effects of the alternatives on fish. Included in these sections are: 1) the results of modeling the effects of management activities; and, 2) a comparison and discussion of risk associated with the implementation of each of the

alternatives; 3) habitat enhancement levels anticipated for the plan; and, 4) mitigation to be applied to protect fish habitat. Taken together, these sections describe the potential cumulative effects of the proposed activities on the fish resources of the Tongass National Forest.

Direct and Indirect Effects

Fish habitat capability and stream productivity interact with many of the resource management activities on the Tongass National Forest. The activities that generally have the greatest potential effect on fish resources are timber harvest, roads, and fish habitat enhancement projects. Mineral activities, recreation use and fire may have an effect on fish, but generally these effects are in only a few localities across the Forest.

Each alternative, A, B, C, D and P, maintains the goal of the 1979 Tongass Land Management Plan: "to preserve the biological productivity of every fish stream on the Tongass." In order to attain this goal, activities which include the maintenance or improvement of fish habitat capability are appropriate.

Riparian Land Use Designations

A riparian land use designation, and its associated management prescription, is applied along all Class I, II or III streams and lakes, and their associated riparian areas, where more development-oriented management would otherwise occur. Those land use designations (LUD's) which normally are more development-oriented are: the Timber Production, Scenic Viewshed, Modified Landscape, Scenic River and Recreation River LUD's. In other designations, such as Primitive Recreation, where management is normally less potentially impacting than would occur in a riparian land use designation, a riparian management land use designation would not apply.

Two riparian management prescriptions were developed for the Forest Plan: 1) Fish Habitat and Water Quality Requirements, and 2) Stream and Lake Protection. The prescription for Fish Habitat and Water Quality Requirements is located in Appendix I of this document, while the Stream and Lake Protection prescription is found in Chapter 3 of the Proposed Revised Forest Plan. The boundaries of the riparian area are identified in Appendix B (in the section on management requirements).

The Stream and Lake Protection and Fish Habitat and Water Quality Requirements Land Use Designations (LUD's) both meet the requirements of all laws and regulations. The emphasis of the Stream and Lake Protection LUD is to maintain riparian habitat for fish and other riparian associated resources. In addition, for fish habitat, its protection, rehabilitation and improvement are emphasized. The emphasis of the Fish Habitat and Water Quality Requirements LUD is to only meet the minimum legal requirements for fish habitat, riparian areas and water quality. For fish habitat, maintenance and rehabilitation are emphasized, although not necessarily improvement.

Alternatives A, B, C and P include only the Stream and Lake Protection Land Use Designation (LUD), and not the Fish Habitat and Water Quality Requirements LUD. The rationale for this is that the Stream and Lake Protection management prescription best meets current direction and public issues. The objective of the Fish Habitat and Water Quality Requirements prescription, which calls for no serious and adverse effect to water quality and fish habitat, is a lesser objective than what is specified in the Stream and Lake Protection prescription but does meet the requirement of the Tongass Timber Reform Act to assure the protection of riparian habitat and is applied in Alternative D.

Timber harvest

Timber harvest has potential positive and negative effects on fish habitat capability. Timber harvest may affect the sources of large woody debris, stream stability and water quality (covered in the watershed section of this chapter). Timber harvest, under some circumstances, may have a positive effect on fish by increasing the amount of primary productivity in a stream system. However, these potential positive effects, which are generally only seasonal in nature, are not quantified in this assessment. Also, timber harvest may fund habitat improvement projects through Knudson-Vandenburg (K-V) funds. K-V funds are made available from timber sale receipts and can be used for the enhancement of non-timber resources.

In the Draft Revision (Revision DEIS, 1990), the effects on coho and Dolly Varden resulting from the implementation of the Stream and Lake Protection management prescription were used in estimating the effects of implementation of all alternatives from timber harvest on fish. The Tongass Timber Reform Act, passed since publication of the Draft Revision, requires riparian protection and incorporates a requirement for no commercial timber harvest within "no less than one hundred feet in width on each side of all Class I streams in the Tongass National Forest, and on those Class II streams which flow directly into a Class I stream." The habitat capability models predict that there would be no reduction in coho capability since coho use only Class I streams and there is no reduction in large woody debris within 100 feet of streams (except occasional road crossing or yarding corridors). The models predict that there could be a very small reduction in Dolly Varden capability on Class II streams which do not flow directly into Class I streams. Dolly Varden inhabiting Class I streams and Class II streams that do flow directly into Class I streams would not be affected by commercial timber harvest. However, with the requirement of the Tongass Timber Reform Act to assure the protection of riparian areas on streams or portions of streams not protected by buffer zones, through the use of Best Management Practices (as defined in the Region 10 Soil and Water Conservation handbook), the predicted effect on fish is negligible. Any estimate of Dolly Varden reduction must be made at the site-specific project level when considering which Class II streams are managed for mandatory no commercial timber harvest 100 foot buffers, as required by the Tongass Timber Reform Act.

Effects on pink salmon were discussed in the previous section on "pink salmon" in the Affected Environment. In that section, no quantitative reductions in pink salmon habitat capability were predicted due to management activities. With implementation of any of the alternatives, no quantitative reductions are predicted either. However, with increased developmental activities, there is added risk of effects to pink salmon habitat capability. These effects are described in the following section.

Although none of the alternatives are anticipated to significantly, or even measurably, affect fish habitat capability, there is a risk of unplanned stream-habitat impacts occurring (such as accelerated numbers of landslides over background levels, blowdown of leave strips, and the subtle impacts that may result from ways that a stream reacts to rain-on-snow events) and of the cumulative effects of many small but individually insignificant actions affecting fish habitat capability. This risk of unplanned activities and cumulative effects is associated with the amount of timber harvest, rate of harvest and location of harvest within a watershed. Harvest on difficult operability ground (see Glossary) would be expected to have a higher risk than on normal operability ground. Failure to implement all aspects of Forest Plan direction which maintain fish habitat also contributes to the risk from timber harvest.

Forest-wide, the acres of difficult lands scheduled for timber harvest in each alternative, as a percent of the total acres scheduled in that alternative, is approximately the same in all alternatives. In Alternative A, the percentage of difficult scheduled is 18 percent, while in all

other alternatives the percentage is 19 percent. This indicates that the risk associated with operations on more difficult ground (generally steeper with greater soil movement hazard) is approximately the same among alternatives. However, the total number of acres of potential impact changes among alternatives.

The data in Table 3-32 present an indication of the potential risk to the fish resource from timber harvest. Table 3-32 compares the number of acres where riparian timber harvest could occur in each management area, with the number of total acres in the management area. ("Management area" throughout this section refers to the 141 management areas used in the current Tongass Forest Plan, as discussed in the introduction to this chapter.) Table 3-29 also shows the proportion of each management area that may be harvested along the riparian areas — a measure of risk and cumulative watershed effects that could occur in that management area. With a higher proportion of the management area harvested in riparian areas, there is an increased chance of unpredicted effects. It is important to note that some of the acres shown as available for timber harvest, although classified as suitable timber, will not be subject to timber harvest, as directed in the management prescriptions and by economics.

Table 3-32

Acres and percent of suitable timber lands in the Stream and Lake Protection or Fish Habitat and Water Quality Requirements land use designation (LUD), by alternative and management area[1]

Mgmt Area[2]	Alt A Acres (%)	Alt B Acres (%)	Alt C Acres (%)	Alt D Acres (%)	Alt P Acres (%)
Chatham Area					
C01	0 (0.0)	0 (0.0)	0 (0.0)	480 (0.2)	0 (0.0)
C03	140 (0.5)	1,338 (4.4)	1,938 (6.3)	1,338 (4.4)	1,898 (6.2)
C06	320 (0.4)	320 (0.4)	380 (0.5)	480 (0.7)	380 (0.5)
C07	1,897 (4.8)	1,937 (4.9)	1,957 (5.0)	1,977 (5.0)	1,917 (4.9)
C10	6,144 (2.1)	6,164 (2.1)	19,628 (6.6)	23,857 (8.0)	19,628 (6.6)
C12	0 (0.0)	0 (0.0)	0 (0.0)	160 (2.1)	0 (0.0)
C13	1,503 (2.0)	3,507 (4.7)	3,988 (5.4)	4,048 (5.5)	4,008 (5.4)
C14	493 (0.5)	514 (0.6)	2,721 (2.9)	514 (0.6)	2,681 (2.9)
C15	598 (0.8)	2,398 (3.0)	6,260 (7.9)	0 (0.0)	6,260 (7.9)
C17	0 (0.0)	0 (0.0)	0 (0.0)	1,154 (2.3)	0 (0.0)
C18	6,530 (6.4)	6,530 (6.4)	6,630 (6.5)	5,931 (5.8)	6,650 (6.5)
C19	4,361 (7.4)	4,361 (7.4)	4,361 (7.4)	4,381 (7.5)	4,361 (7.4)
C21	120 (0.2)	120 (0.2)	640 (0.9)	400 (0.6)	1,161 (1.7)
C25	120 (0.4)	0 (0.0)	800 (2.4)	60 (0.2)	0 (0.0)
C27	0 (0.0)	1,101 (5.2)	1,462 (7.0)	1,462 (7.0)	1,462 (7.0)
C28	0 (0.0)	6,429 (7.9)	6,609 (8.1)	7,250 (8.9)	6,469 (8.0)
C29	100 (0.1)	4,042 (3.9)	4,743 (4.5)	7,142 (6.8)	6,342 (6.1)
C30	2,800 (2.5)	3,460 (3.1)	5,641 (5.0)	6,837 (6.1)	9,298 (8.2)
C31	3,020 (4.1)	3,040 (4.1)	3,260 (4.4)	3,160 (4.3)	3,260 (4.4)
C32	600 (2.4)	680 (2.7)	1,180 (4.7)	1,739 (7.0)	1,880 (7.5)
C33	0 (0.0)	0 (0.0)	0 (0.0)	1,080 (2.6)	2,519 (6.1)
C34	2,255 (3.1)	2,995 (4.1)	2,375 (3.3)	3,494 (4.8)	3,314 (4.6)
C37	7,687 (5.9)	7,747 (6.0)	8,726 (6.7)	8,427 (6.5)	8,726 (6.7)
C39	0 (0.0)	1,777 (4.7)	2,477 (6.5)	2,816 (7.4)	2,477 (6.5)
C40	6,523 (3.6)	7,003 (3.9)	10,402 (5.8)	9,341 (5.2)	5,219 (2.9)
C41	4,003 (5.4)	4,003 (5.4)	4,363 (5.9)	4,523 (6.1)	4,363 (5.9)
C43	2,664 (2.6)	2,664 (2.6)	4,365 (4.2)	3,385 (3.3)	1,322 (1.3)
C44	260 (0.4)	300 (0.5)	1,140 (1.8)	779 (1.2)	980 (1.5)
C45	60 (0.1)	60 (0.1)	361 (0.7)	361 (0.7)	100 (0.2)
C46	20 (0.1)	20 (0.1)	40 (0.2)	120 (0.7)	40 (0.2)
C48	2,783 (3.4)	2,843 (3.5)	4,185 (5.1)	3,064 (3.8)	1,983 (2.4)
C50	0 (0.0)	0 (0.0)	0 (0.0)	882 (2.0)	0 (0.0)
C51	0 (0.0)	0 (0.0)	0 (0.0)	5,359 (4.2)	0 (0.0)
C53	140 (0.4)	760 (2.2)	1,041 (3.1)	901 (2.7)	900 (2.7)
C56	20 (0.0)	20 (0.0)	80 (0.1)	80 (0.1)	20 (0.0)
C60	0 (0.0)	0 (0.0)	0 (0.0)	21 (0.4)	0 (0.0)
C61	0 (0.0)	0 (0.0)	0 (0.0)	200 (1.5)	0 (0.0)
Stikine Area					
S01	2,095 (4.2)	2,095 (4.2)	2,742 (5.5)	2,115 (4.2)	2,742 (5.5)
S02	0 (0.0)	0 (0.0)	0 (0.0)	3,401 (12.1)	2,093 (7.4)
S04	7,193 (5.0)	6,295 (4.4)	10,462 (7.3)	7,890 (5.5)	6,154 (4.3)
S05	0 (0.0)	0 (0.0)	0 (0.0)	1,055 (3.5)	0 (0.0)
S07	0 (0.0)	1,650 (3.5)	1,871 (4.0)	1,972 (4.2)	0 (0.0)
S08	0 (0.0)	881 (5.4)	881 (5.4)	861 (5.3)	0 (0.0)
S09	2,996 (3.3)	2,916 (3.2)	3,236 (3.5)	3,356 (3.7)	3,236 (3.5)
S10	2,599 (2.1)	2,639 (2.2)	2,779 (2.3)	2,659 (2.2)	2,779 (2.3)
S11	1,699 (1.3)	2,138 (1.6)	2,758 (2.0)	2,559 (1.9)	2,758 (2.0)
S12	0 (0.0)	0 (0.0)	0 (0.0)	539 (0.7)	0 (0.0)
S13	1,160 (0.8)	3,298 (2.3)	4,499 (3.1)	3,899 (2.7)	4,079 (2.8)
S14	0 (0.0)	40 (1.4)	40 (1.4)	0 (0.0)	40 (1.4)
S16	740 (1.0)	1,820 (2.5)	2,320 (3.2)	2,181 (3.0)	1,980 (2.7)
S17	2,322 (3.0)	2,422 (3.2)	2,642 (3.5)	2,602 (3.4)	2,502 (3.3)

Table 3-32 (continued)

Mgmt Area[2]	Alt A Acres (%)	Alt B Acres (%)	Alt C Acres (%)	Alt D Acres (%)	Alt P Acres (%)
S18	140 (1.6)	100 (1.2)	220 (2.5)	321 (3.7)	140 (1.6)
S19	4,195 (3.6)	4,195 (3.6)	4,235 (3.6)	4,075 (3.5)	4,235 (3.6)
S20	2,890 (2.5)	3,130 (2.7)	3,290 (2.8)	3,351 (2.9)	3,250 (2.8)
S21	20 (0.2)	20 (0.2)	20 (0.2)	40 (0.4)	20 (0.2)
S22	160 (1.1)	160 (1.1)	901 (6.2)	961 (6.6)	901 (6.2)
S23	5,648 (3.7)	6,228 (4.1)	8,351 (5.5)	7,831 (5.2)	8,351 (5.5)
S25	3,980 (3.1)	4,480 (3.5)	5,680 (4.4)	4,060 (3.2)	5,640 (4.4)
S26	2,160 (1.8)	2,341 (2.0)	7,241 (6.1)	3,161 (2.7)	3,821 (3.2)
S29	0 (0.0)	0 (0.0)	12,271 (8.1)	8,139 (5.4)	10,695 (7.1)
S31	2,861 (5.4)	1,661 (3.1)	3,481 (6.6)	2,381 (4.5)	3,481 (6.6)
S33	1,121 (2.4)	1,121 (2.4)	1,221 (2.7)	1,221 (2.7)	1,201 (2.6)
S35	3,843 (3.8)	6,144 (6.1)	6,164 (6.1)	6,165 (6.1)	6,064 (6.0)
Ketchikan Area					
K01	1,520 (2.1)	2,018 (2.8)	2,459 (3.5)	2,459 (3.5)	2,359 (3.3)
K03	2,827 (2.6)	3,007 (2.8)	3,589 (3.3)	3,830 (3.5)	3,328 (3.1)
K04	221 (0.9)	402 (1.6)	442 (1.8)	482 (1.9)	442 (1.8)
K05	702 (1.7)	702 (1.7)	762 (1.8)	802 (1.9)	762 (1.8)
K06	0 (0.0)	0 (0.0)	0 (0.0)	220 (0.9)	220 (0.9)
K07	1,860 (1.6)	3,923 (3.3)	3,923 (3.3)	3,983 (3.4)	3,923 (3.3)
K08	1,400 (1.1)	1,760 (1.4)	2,180 (1.8)	1,920 (1.6)	1,800 (1.5)
K09	4,826 (5.1)	4,826 (5.1)	5,146 (5.4)	4,966 (5.2)	4,665 (4.9)
K10	680 (1.4)	680 (1.4)	940 (2.0)	961 (2.0)	940 (2.0)
K11	522 (1.2)	522 (1.2)	643 (1.4)	683 (1.5)	643 (1.4)
K13	0 (0.0)	0 (0.0)	0 (0.0)	40 (0.2)	0 (0.0)
K14	3,961 (2.9)	3,980 (2.9)	5,179 (3.8)	4,520 (3.3)	5,319 (3.9)
K15	980 (1.8)	1,340 (2.5)	1,620 (3.0)	1,040 (2.0)	1,340 (2.5)
K17	2,418 (2.9)	2,817 (3.3)	4,795 (5.7)	3,696 (4.4)	4,775 (5.7)
K18	2,502 (2.3)	2,202 (2.1)	4,984 (4.7)	4,164 (3.9)	4,984 (4.7)
K19	321 (0.7)	321 (0.7)	923 (2.1)	0 (0.0)	642 (1.5)
K20	1,423 (3.7)	1,843 (4.9)	2,805 (7.4)	3,205 (8.4)	2,064 (5.4)
K21	1,458 (1.0)	2,956 (2.0)	4,515 (3.0)	3,895 (2.6)	3,056 (2.1)
K22	1,398 (1.5)	199 (0.2)	3,196 (3.4)	3,115 (3.3)	2,916 (3.1)
K24	1,782 (4.0)	1,802 (4.1)	1,923 (4.4)	2,083 (4.7)	1,923 (4.4)
K25	661 (1.1)	1,001 (1.6)	1,762 (2.8)	1,842 (2.9)	1,762 (2.8)
K26	0 (0.0)	0 (0.0)	0 (0.0)	581 (2.4)	0 (0.0)
K28	680 (0.8)	560 (0.7)	2,579 (3.2)	2,959 (3.7)	560 (0.7)
K29	1,459 (1.9)	1,499 (1.9)	3,477 (4.5)	1,539 (2.0)	3,317 (4.3)
K30	2,924 (2.5)	3,064 (2.6)	5,905 (5.1)	3,684 (3.2)	5,525 (4.8)
K32	5,106 (2.9)	7,465 (4.2)	9,126 (5.2)	9,086 (5.1)	8,865 (5.0)
K34	520 (2.3)	200 (0.9)	1,219 (5.3)	1,060 (4.6)	1,100 (4.8)
K35	3,718 (3.8)	3,618 (3.7)	3,858 (4.0)	4,078 (4.2)	3,858 (4.0)
K36	0 (0.0)	0 (0.0)	0 (0.0)	160 (1.4)	0 (0.0)
K37	0 (0.0)	0 (0.0)	0 (0.0)	80 (0.7)	0 (0.0)
K39	800 (1.1)	1,819 (2.4)	2,419 (3.2)	1,859 (2.5)	2,399 (3.2)
K40	0 (0.0)	0 (0.0)	0 (0.0)	20 (0.4)	0 (0.0)
K41	80 (0.2)	60 (0.2)	120 (0.3)	60 (0.2)	60 (0.2)
K44	0 (0.0)	0 (0.0)	4,601 (7.4)	2,961 (4.8)	4,361 (7.0)
K45	0 (0.0)	0 (0.0)	0 (0.0)	300 (0.4)	0 (0.0)
Total	**149,735 (0.9)**	**186,496 (1.1)**	**284,146 (1.7)**	**270,368 (1.6)**	**263,688 (1.6)**

Source: Revision data base Query 235L1, June 1991.

[1] The Fish Habitat and Water Quality Requirements land use designation is applied only in Alternative D. All other alternatives use the Stream and Lake Protection land use designation. Percent means the percentage of each management area within the land use designation.

[2] Management areas in Wilderness or in LUD II are not included in this table.

Forest-wide, the risk of impacts to stream habitats due to timber harvest activities is greatest in Alternative C, followed by Alternatives D, P, B and A. By alternative, the management areas with the highest risk are shown in Table 3-33. Only management areas with over five percent of the entire management area available for timber harvest in the riparian areas are shown. (Five percent was used since it is a good indicator of the differences among alternatives. It does not represent an important threshold of risk.)

Table 3-33

Management areas with more than five percent of the acres available for riparian timber harvest

	Management Areas by Administrative Area		
Alt.	Chatham	Stikine	Ketchikan
A	C18, C19, C37, C41	S4, S31	K9
B	C18, C19, C27, C28, C37, C41	S8, S35	K9
C	C3, C7, C10, C13, C15, C18, C19, C27, C28, C30, C37, C39, C40, C41, C48	S1, S4, S8, S22, S23, S26, S29, S31, S35	K9, K17, K20, K30, K32, K34, K44
D	C7, C10, C13, C18, C19, C27-30, C32, C37, C39-41	S2, S4, S8, S22, S23, S29, S35	K9, K20, K32
P	C3, C10, C13, C15, C18, C19, C27-30, C32, C37, C39-41	S1, S2, S22, S23, S29, S31, S35	K17, K20, K32, K44

Table 3-138, located in the cumulative effects part of the Timber section, gives more information on the potential cumulative effects, in terms of land disturbance and potential risk, to the fisheries resource associated with management activities on the Forest. It shows the number of acres scheduled for harvest over the entire timber rotation in each Management Area, and the percentage of the Management Area which those acres encompass. Analysis of this shows that Alternative D has 38, Alternative C has 36, Alternative P has 33, Alternative B has 22, and Alternative A has 16 Management Areas with greater than 30 percent of the land area scheduled for timber harvest over the timber rotation. On an individual watershed within the Management Area, the percentage of acres scheduled for harvest may be considerably larger or smaller than the number shown for the entire Management Area.

Forest-wide standards and guidelines require that if a third order or larger watershed would experience more than 30 percent of the area with major land disturbance in less than a 15 year period, then a cumulative watershed effects analysis must be undertaken. (Note: The Management Areas described in the previous paragraph would have greater than 30 percent of the area harvested over a 150 year period, not a 15 year period.) Those Management Areas with a higher percentage of timber scheduled for harvest could be expected to require further cumulative effects analysis as a result of the Forest-wide guideline.

The monitoring and evaluation process, required in all alternatives (see Chapter 5 of the Proposed Forest Plan for monitoring requirements of the preferred alternative), should reduce the risk of future effects on fish habitat due to timber harvest. During monitoring, an assessment is made of whether implementation is occurring as planned, and whether the effects of management direction are as anticipated. Activities, or standards and guidelines, that do not meet the objective of maintaining or improving fish habitat, will then be modified.

Roads

Road construction and use are often the greatest potential sediment source of all land-disturbing activities, over both the short-term and the long-term. Improperly designed, constructed, or maintained road crossings of streams can block fish passage and increase sediment deposited in fish spawning areas. (See also fish affected environment on roads.) Roads constructed in riparian areas can constrict the floodplain and channel, resulting in changes in channel morphology and associated habitat. Roads also increase recreation access and fishing opportunities, but the increase in fishing pressure can result in potential overharvest of wild stocks of fish unless carefully regulated. Borrow pits, dug in conjunction with road construction, have provided additional fish rearing habitat in some areas of the Forest.

With the application of Best Management Practices (FSH 2509.22, as summarized in Appendix C of the Draft Forest Plan and described earlier in this Fish section), no Forest-wide effects on fish habitat are anticipated due to the construction and use of roads. The Water section of this chapter describes some of the ways that roads may affect water quality and how the use of Best Management Practices has been shown to mitigate the effects of management activities on water. However, there is a risk to water quality and fish habitat which would result from the improper application of Best Management Practices or from unplanned impacts such as road failures, use of construction materials which break down at a rapid rate, washout of culverts and bridges, and the failure of culverts and bridges to pass fish even though the original plan was for fish passage. The risk of these unplanned impacts increases with a larger number of roads and would differ if some alternatives required roads on more unstable soils. As described previously for timber harvest, each alternative harvests timber on lands with approximately the same degree of difficulty. Roads, therefore, would be expected to have equal risk among alternatives.

However, total road differences among alternatives and by management area change by alternative. Table 3-34 shows the number of existing roads in each management area of the Tongass, as well as the cumulative number of roads that are anticipated on the Forest 10 years and 100 years after the revised Forest Plan is implemented. Currently, 35 percent of roads are closed to motorized public use. Although the roads may be constructed over the next 100 years, essentially all of the roads are anticipated to be completed in the next 50 years.

Forest-wide, the largest numbers of roads are anticipated for construction in Alternative D, followed by Alternatives C, P, B and A. Therefore, the alternatives with the greatest risk of unplanned impacts in descending order are D, C, P, B and A. After 100 years, Alternative D would have approximately three times the number of roads as currently exist, while Alternative A would have about one and one-half times the number of existing roads.

Table 3-34 also shows that the number of roads in each individual management area generally follows the Forest-wide trend. There are some exceptions, such as management area K19, where the number of road miles is greater in all other alternatives than in Alternative D. In all alternatives, the Ketchikan Administrative Area has about half of the roads of the entire Tongass National Forest.

Table 3-34

Miles of existing and total anticipated roads, by management area and alternative, for Decades 1 and 10 [1]

Mgmt. Area	Acres	Existing Road Miles	Alt A 1	Alt A 10	Alt B 1	Alt B 10	Alt C 1	Alt C 10	Alt D 1	Alt D 10	Alt P 1	Alt P 10
C03	30,602	1	0	0	4	17	11	50	4	18	8	40
C05	30,229	0	1	2	0	0	0	0	0	0	0	0
C06	72,211	15	0	0	0	0	1	4	1	6	1	4
C07	39,335	0	8	35	8	37	8	40	8	40	7	33
C10	297,655	4	4	13	4	23	0	0	8	41	0	0
C11A	74,519	1	0	0	0	0	0	0	0	0	0	0
C12	7,622	0	0	0	0	0	0	0	4	22	0	0
C13	74,121	17	15	76	34	171	25	118	46	229	35	117
C14	92,778	0	12	52	13	52	50	187	11	53	50	191
C15	79,410	0	0	0	0	0	0	0	0	0	2	9
C17	49,302	0	0	0	0	0	0	0	5	18	0	0
C18	102,183	8	12	59	12	60	12	59	12	52	14	70
C19	58,578	33	10	48	10	46	10	49	11	48	13	53
C21	69,120	8	12	40	12	40	28	137	23	95	16	80
C22	981,884	15	0	0	0	0	0	0	0	0	0	0
C25	33,197	4	0	0	0	0	0	0	0	0	0	0
C27	21,008	8	0	0	2	9	2	9	4	10	1	3
C28	81,130	15	0	0	18	86	18	90	29	99	30	66
C29	104,292	34	2	3	12	35	19	39	39	97	13	60
C30	112,824	91	21	58	18	70	19	97	44	127	19	72
C31	73,842	18	18	75	18	75	30	129	23	110	22	73
C32	24,918	18	3	9	3	12	10	21	7	18	6	20
C33	41,553	0	0	0	0	0	0	0	2	9	4	21
C34	72,571	19	14	67	14	66	6	24	22	108	16	25
C36	34,281	7	0	0	0	0	0	0	0	0	0	0
C37	147,132	125	42	143	47	137	54	115	33	147	37	115
C39	38,008	0	0	0	6	11	7	21	5	14	12	22
C40	180,489	47	5	21	6	21	4	21	5	13	3	6
C41	74,143	31	10	39	10	40	32	45	10	47	17	45
C43	104,011	27	15	37	24	39	39	71	19	71	16	41
C44	64,169	42	3	10	3	13	6	24	1	3	3	13
C45	53,198	1	0	0	0	0	0	0	0	0	0	0
C46	17,301	1	0	0	0	0	0	0	0	1	0	0
C48	81,649	15	1	2	2	6	1	5	1	4	0	1
C53	33,809	12	1	7	2	10	3	20	5	19	2	14
C54	17,729	17	0	0	0	0	0	1	0	0	0	1
C55	11,644	20	0	0	0	0	0	1	0	0	0	0
C56	74,046	0	0	0	0	0	0	0	0	0	0	0
C57	19,754	33	0	0	0	0	0	0	0	0	0	0
C61	13,010	2	0	0	0	0	0	0	0	0	0	0
Chatham Total		**689**	**209**	**796**	**282**	**1,076**	**395**	**1,377**	**382**	**1,519**	**347**	**1,195**
K01	71,257	128	24	65	29	87	40	118	31	116	46	113
K02	11,200	2	0	0	0	0	0	0	0	0	0	0
K03	108,805	218	24	119	27	132	36	168	39	191	49	160
K03A	57,392	14	0	0	0	0	0	0	0	0	0	0
K04	25,098	43	4	9	8	26	12	42	17	56	11	39
K05	41,729	122	26	50	26	50	28	53	30	61	16	53
K06	25,486	2	3	11	0	0	0	0	13	58	10	51
K07	118,310	277	30	96	45	139	60	144	56	160	42	144
K08	123,835	128	25	124	37	179	71	250	47	216	53	202
K09	95,068	190	26	122	26	121	28	133	30	136	34	122
K10	48,194	61	10	44	10	44	13	52	12	59	12	51
K11	44,554	121	26	49	25	49	29	63	32	78	14	63
K13	21,917	0	0	0	0	0	3	16	5	26	0	0
K14	137,130	23	48	207	42	210	53	261	49	223	52	242
K15	53,328	43	14	69	20	96	24	108	17	83	26	100

Table 3-34 (continued)

Mgmt. Area	Acres	Existing Road Miles	Alt A 1	Alt A 10	Alt B 1	Alt B 10	Alt C 1	Alt C 10	Alt D 1	Alt D 10	Alt P 1	Alt P 10
K16	39,888	2	0	0	0	0	0	0	0	0	0	0
K17	84,280	81	29	59	28	63	22	92	27	78	26	91
K18	106,686	34	24	96	23	93	49	212	41	176	54	212
K19	43,041	0	5	26	5	25	12	60	0	2	9	42
K20	37,983	10	17	80	20	94	29	144	30	143	23	109
K21	148,481	19	12	51	24	109	45	215	46	219	30	133
K22	93,566	0	36	173	4	18	70	334	79	341	67	306
K24	44,104	0	25	98	24	104	28	113	35	132	23	113
K25	62,506	0	17	83	23	116	32	161	43	196	32	161
K26	24,460	0	0	0	0	0	0	0	21	70	0	0
K28	80,354	5	11	52	9	45	29	139	46	185	10	47
K29	77,367	0	25	126	25	126	60	300	27	134	59	272
K30	116,066	0	40	184	41	189	74	358	48	239	81	352
K32	176,716	103	57	241	90	368	120	505	118	486	105	469
K33	31,351	2	0	0	0	0	0	0	0	0	0	0
K34	23,090	3	5	20	2	10	10	50	7	33	7	34
K35	96,875	59	61	301	59	293	73	334	76	360	71	334
K36	11,192	0	0	0	0	0	0	0	0	1	0	0
K37	11,272	0	0	0	0	0	0	0	6	30	0	0
K38	7,014	22	0	0	0	0	0	0	0	0	0	0
K39	75,661	73	20	97	39	193	53	259	42	207	52	258
K40	5,506	0	0	0	0	0	0	0	1	6	0	0
K41	38,952	4	3	14	1	6	3	17	2	9	2	9
K43	2,295,918	15	0	0	0	0	0	0	0	0	0	0
K44	62,295	28	0	0	0	0	14	39	11	26	4	22
K45	67,730	0	0	0	0	0	0	0	0	0	0	0
Ketchikan Total		**1,832**	**647**	**2,666**	**712**	**2,985**	**1,120**	**4,740**	**1,084**	**4,536**	**1,020**	**4,304**
S01	49,864	0	23	94	23	93	31	132	24	102	29	130
S02	28,188	0	0	0	0	0	0	0	21	75	13	63
S04	143,972	148	61	176	61	161	88	223	80	191	69	156
S05	29,724	8	0	0	0	0	0	0	30	104	0	0
S07	67,700	0	0	0	18	88	22	108	34	137	0	0
S08	16,184	0	0	0	8	39	8	39	11	48	0	0
S09	91,686	18	50	167	32	161	42	189	52	229	50	189
S10	121,238	51	33	148	35	151	38	163	37	151	36	163
S11	135,791	86	39	132	36	143	35	150	38	164	33	151
S12	74,860	1	1	2	2	8	0	0	24	115	0	0
S13	145,773	45	20	64	49	245	56	280	54	267	56	268
S16	72,338	68	8	29	27	112	32	130	27	123	34	119
S17	76,421	112	17	68	19	76	22	90	21	95	19	87
S18	8,633	3	0	1	0	0	1	3	3	10	1	2
S19	117,584	121	24	99	24	100	28	103	31	110	25	102
S20	116,935	0	43	125	26	129	28	141	31	150	30	140
S21	11,376	13	0	0	1	1	2	6	7	23	0	0
S22	14,480	0	0	0	0	0	6	17	7	19	5	16
S23	151,683	37	57	172	88	186	95	262	96	292	80	263
S24	83,371	1	0	0	0	0	0	0	0	0	0	0
S25	128,602	89	45	165	49	184	50	216	51	201	52	216
S26	118,986	1	37	109	40	126	50	197	35	141	43	177
S29	151,271	0	0	0	0	0	9	38	5	18	7	34
S31	52,974	0	11	39	9	34	12	54	12	54	20	55
S33	45,867	0	19	60	14	65	15	66	18	79	20	67
S35	101,365	32	10	38	21	89	22	98	20	87	23	90
Stikine Total		**834**	**498**	**1,688**	**582**	**2,191**	**692**	**2,705**	**769**	**2,985**	**645**	**2,488**
Forest Total		**3,355**	**1,354**	**5,150**	**1,576**	**6,252**	**2,207**	**8,822**	**2,235**	**9,040**	**2,012**	**7,987**

Source: FORPLAN outputs for roads constructed; GIS queries for existing roads

[1] Roads are shown for the 1st and 10th decades following revised Forest Plan implementation. Only management areas with existing roads, or management areas that will have roads constructed in them, are shown. (Note: some existing roads are shown in Wilderness and LUD II Land Use Designations). Most or all new road development will occur in approximately the first 50 years after implementation.

Fish Habitat Improvement

Fish habitat improvement is emphasized in all alternatives. An enhancement program, similar in magnitude to that of the past ten years, is proposed in all alternatives. A summary of enhancement activities during the last ten-year period was included in Table 3-22.

Proposed numbers of projects, types and distribution between administrative areas for the first decade are shown in Table 3-35. A listing of the specific projects and their anticipated maintenance and monitoring costs is included in Chapter 2 of the Forest Plan. Table 3-35 is a listing of potential projects and represents an estimate of the fish habitat improvement program level common to all alternatives. Most projects have not had project-specific ground verification or been subject to site-specific environmental analysis. Some of the projects are designed to rehabilitate past management-related impacts on habitat or, in some cases, natural events or conditions. It is the objective of all alternatives to maintain fish habitat at existing levels and to use habitat improvement projects to rehabilitate conditions created by past land management activities and to improve on present conditions.

Table 3-35

Improvement projects by type and location, total projects for the first decade[1]

Project Type	(one year projects/multiple year projects)[2] Chatham	Stikine	Ketchikan	Total
Small instream structural[3]	2/3	34/1	41/2	77/6
Watershed rehabilitation[3]	8/0	0/0	3/0	11/0
Structural fish passage	15/0	8/1	38/0	61/1
Falls modification/barrier removal	3/0	2/1	6/0	11/1
Spawning channels	1/1	1/0	7/0	9/1
Rearing ponds/streams	1/3	8/0	7/0	16/3
Barren lake stocking	0/1	0/0	0/0	0/1
Cooperative fish stocking (not barren lake)	3/3	1/11	1/6	5/20
Incubation boxes	1/1	2/0	0/0	3/1
Lake fertilization	0/2	0/1	2/4	2/7
In-lake structural[4]	0/1	10/0	0/0	10/1
Total	**34/15**	**66/15**	**105/12**	**205/42**

Source: List of potential projects developed by Administrative Area Fish Biologists, 1991.

[1] This table lists potential projects. Most have not been through project-specific ground verification or National Environmental Policy Act (NEPA) analysis. Some of the projects (the majority listed in footnote 3) may be considered rehabilitation rather than enhancement. Of the 247 projects, 23 projects are located in designated Wilderness.

[2] Some projects are completely implemented in a one-year period, while others may be recurring for a number of years. For instance, lake fertilization is usually a multi-year project.

[3] The majority of the watershed rehabilitation and small instream structural projects, which includes projects such as large woody debris and gabion placement, are designed to rehabilitate impacts resulting from past management activities.

[4] In-lake structural projects are usually not for mitigation purposes. This generally will include falling trees into lakes from the lake margin or building artificial reefs.

The benefits, in terms of pounds of commercially harvested salmon which could accrue from these projects, are shown in Figure 3-14 (see also Table 3-29). As shown in the illustration, projects constructed during the first ten years of Forest Plan implementation will provide benefits for at least 50 years. Typically, full project capability takes from 5 to 20 years to be achieved, depending on the type of project.

Figure 3-14

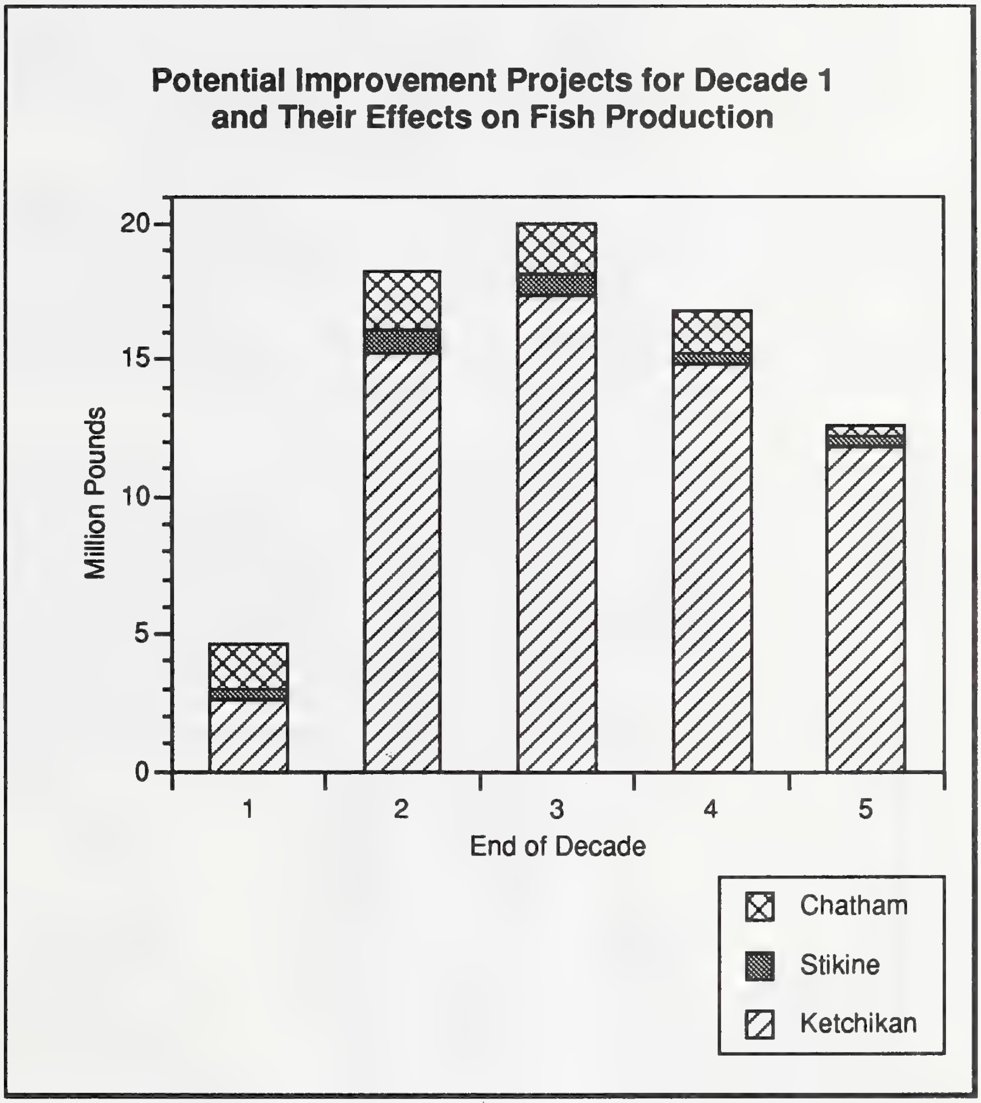


Figure 3-14 shows that an annual average of approximately 4.7 million pounds of salmon improvement available to the commercial fishery may be feasible during the ten year period following implementation. About 18 million pounds of improvement are anticipated by the end of the second decade, and 20 million pounds of salmon should be available by the third decade. Only theoretically are these numbers of fish available to the fisheries: there are many other factors limiting the actual harvest, such as off-shore survival and high-seas interception. Although fish harvest is shown in terms of pounds harvestable to the commercial fishery, the fish would also be available to, and harvested by, subsistence and sportfish users. The distribution of these fish between the different user groups is set by the Alaska State Board of Fisheries, in cooperation with the Alaska Department of Fish and Game.

Some of the improvement projects specifically target sport fishing demand, most often for lakes with resident fish populations (fish that do not migrate to the sea). Table 3-36 and Figure 3-15 show an estimate of the fish user days (FUD's) that may result from the implementation of the projects. In addition to showing the projects which directly target sport fishing, Table 3-36 also shows an estimate of the harvest by sport fishers of the commercially available salmon. For conversion purposes, each 1,000 pounds of commercially harvested salmon was assumed to also result in one fish user day. An average annual increase of approximately 11,300 FUD's for the first decade after plan implementation is projected. The increase peaks in the second decade at approximately 36,200 FUD's, and decreases to about 17,500 FUD's by the end of the fifth decade. The largest increases in projects specifically targeted for sport fish are on the Chatham Area, while, when added to the production increases associated with commercial fish harvest, the Ketchikan area has the largest increase.

The identified projects include proposals for improvement in Wilderness. The Wilderness Act states that Wilderness is "managed so as to preserve its natural conditions," and precludes most fish improvement activities. However, ANILCA Section 1315 modifies the Wilderness Act and specifically allows aquaculture in Wilderness in Alaska, but requires that facilities "shall be constructed, managed, and operated in a manner that minimizes adverse impacts on the wilderness character of the area." The improvement represented in Figures 3-14 and 3-15 include 23 projects in designated Wilderness.

Current Forest Service direction is that comparable projects identified outside of Wilderness should be implemented first, projects within Wilderness next, in order to attain the Salmon Enhancement Plans' goals (discussed in the demand section of the affected environment), all inventoried projects, both outside and inside Wilderness, are anticipated to be necessary during the next decade. Other projects outside of Wilderness, which could be substituted for projects within Wilderness, may exist, but to date, these have not been identified. Although all identified projects are anticipated to be necessary to meet the Salmon Enhancement goals, individual projects are still subject to site-specific environmental analysis and public comment prior to the final decision to implement the project. Standards and guidelines for habitat improvement in the Wilderness land use designations (WW and WM) are located in the Proposed Forest Plan.

Table 3-36

Direct[1] and indirect[2] fish user days (thousands) resulting from improvement, by Administrative Area[3]

	Chatham		Stikine		Ketchikan		
Decade	Direct	Indirect	Direct	Indirect	Direct	Indirect	Total
1	4.0	1.7	0.1	0.3	2.7	2.5	11.3
2	8.4	2.1	0.1	0.9	9.5	15.2	36.2
3	0.8	1.8	0.1	0.8	9.2	17.4	30.1
4	0.6	1.6	0.0	0.4	7.1	14.8	24.5
5	0.0	0.4	0.0	0.3	4.9	11.9	17.5

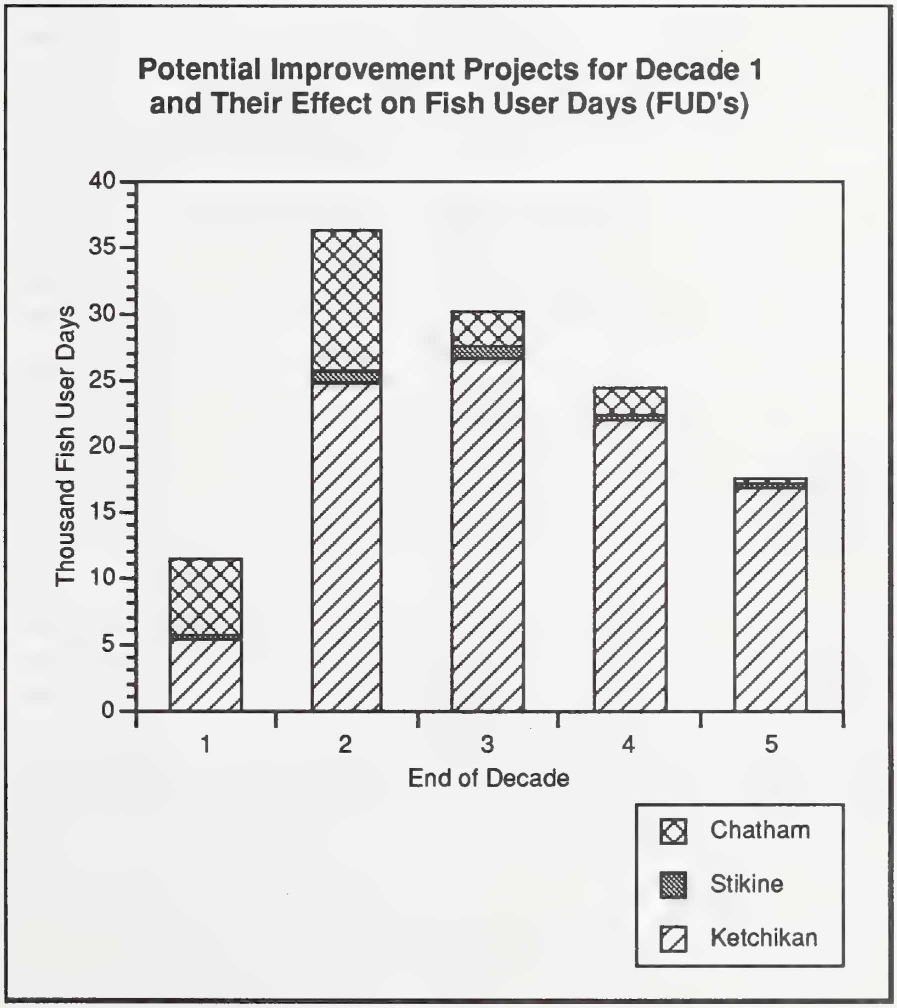
Source: List of potential projects developed by Administrative Area Fish Biologists, 1991.

[1] Direct Fish User Days (FUD's) are those that result from projects specifically constructed for sport fishing purposes.

[2] Indirect FUD's are those that result from sport harvest of a portion of the projects that are available for commercial harvest. The indirect FUD's were calculated by attributing one FUD to each 1,000 pounds of improved potential commercial fish harvest.

[3] The table represents only those projects built during the first decade of implementation of the Revised Forest Plan. Annual average fish user days from the projects are shown for each decade following Plan implementation.

Figure 3-15



Cumulative Effects

The previous sections on timber, roads and fish habitat improvement displayed the anticipated effects of the alternatives on Management Indicator Species (MIS) that are quantified (such as habitat enhancement), as well as the effects of the alternatives that are not directly quantified (such as risk). Table 3-37 shows the cumulative anticipated quantified fish outputs of the alternatives, in terms of fish habitat capability. Habitat capability for pink and coho salmon are measured in numbers of smolts (juvenile fish which migrate to the sea), and for Dolly Varden char in numbers of fish. The habitat capability does not differ significantly among alternatives.

Table 3-37 shows the anticipated habitat capability and percent change with, and without, the benefits of fish habitat enhancement. The table shows that the major enhancement emphasis is for coho salmon (up to a 47 percent increase) while most of the net reduction in habitat capability (up to 1.4 percent) is expected for Dolly Varden char. The reductions are due to the long-term effects of past harvest practices.

In all alternatives, viable fish populations will be maintained, distributed across the Forest in a pattern very similar to the current situation. The maximum reduction in Forest-wide capability could approach 1.5 percent (from the natural stream-habitat capability) for Dolly Varden char. Information presented in earlier portions of this section indicate that in some of the locations the reduction could be greater, but with the goal in all alternatives to maintain or improve fish populations, in no management area will viability of the management indicator species become a concern.

Table 3-37

Percent of 1954 fish MIS habitat capability for all alternatives (including designated Wilderness)

Management Indicator and Year	Millions of Fish Produced	Percent Change from 1954
With Enhancement Projects in the First Decade:		
Pink Salmon		
Year 1954	2,394.0 smolts	
Year 1988	2,454.0 smolts	+ 2.5%
Year 2000	2,537.0 smolts	+ 6.0%
Year 2150	2,513.0 smolts	+ 5.0%
Coho Salmon		
Year 1954	19.1 smolts	
Year 1988	19.1 smolts	No Change
Year 2000	Up to 23.9 smolts	+ 25%
Year 2150	Up to 28.2 smolts	+ 47%
Dolly Varden		
Year 1954	67.9 fish	
Year 1988	67.4 fish	- 0.7%
Year 2000	67.0 fish	- 1.0%
Year 2150	66.0 fish	- 1.4%
Without Enhancement Projects:		
Pink Salmon		
Year 1954	2,394.0 smolts	
Year 1988	2,454.0 smolts	+ 2.5%
Year 2000	2,454.0 smolts	+ 2.5%
Year 2150	2,454.0 smolts	+ 2.5%
Coho Salmon		
Year 1954	19.1 smolts	
Year 1988	19.1 smolts	No Change
Year 2000	19.1 smolts	No Change
Year 2150	19.0 smolts	- 0.5%
Dolly Varden		
Year 1954	67.9 fish	
Year 1988	67.4 fish	- 0.7%
Year 2000	67.0 fish	- 1.0%
Year 2150	66.0 fish	- 1.4%

Source: Habitat Capability Models (see Appendix B); List of potential projects developed by Administrative Area Fish Biologists, 1991.

Other Aspects of Effects

Sensitive Species

There are no threatened or endangered fish species on the Tongass National Forest. However, three specific fish populations have been designated as sensitive species by the Regional Forester. Unlike the management indicator species, which are widely distributed across the Forest, each of these populations have very limited distributions. The species are the northern pike in Pike Lakes at Yakutat, a large type of chum salmon near Hyder, and island runs of king salmon in King Salmon River and Wheeler Creek on Admiralty Island. Potential effects of the alternatives on the viability of these species are considered in the section on Threatened, Endangered and Sensitive Species.

ANILCA 507(b)

ANILCA 507(b) requires the submittal of a report to the U.S. Congress on the status of cooperative fish planning on the Tongass, a description of current hatchery and aquaculture projects with an analysis of the success of these projects, and a prioritized list of projects anticipated for the duration of the management plan. This report expands upon some of the information in this fish section, and also summarizes additional information concerning past and proposed enhancement projects. A discussion of the cooperative fish planning process is also included in the report. A draft copy of this report was included with the Revision DEIS (1990) and a final copy will be released at the time of Forest Plan completion.

Other Plans and Litigation

Legislation was recently enacted by the U.S. Congress and the State of Alaska that directly affects riparian areas and fish resources. The requirements of the Tongass Timber Reform Act have been discussed in previous portions of this fish section.

The requirements of the Tongass Timber Reform Act (TTRA) have resulted in modifications to both the Stream and Lake Protection and Fish Habitat and Water Quality Requirement management prescriptions as used in the Revision DEIS (1990). With application of the TTRA requirements, modeling indicates there would be no reduction in habitat capability.

The State of Alaska has recently enacted into law changes to their State Forest Practices Act (May 1990). Prior to adopting the revisions of the Forest Practices Act, there was essentially no restriction of timber harvest in the riparian area. The revisions to the Forest Practices Act include different standards for private and State lands. For private lands, there would be a no-harvest area within 66 feet of anadromous fish streams, while on State lands the no harvest area would range between 100 and 300 feet. Fish habitat capability models estimate that implementation of the standards for private lands would result in small decreases in capability, while the standards for State lands would maintain habitat capability.

Section 103(b) of the Tongass Timber Reform Act requires that, "No later than one year after the date of enactment of this act, the Secretary of Agriculture, in consultation with the State of Alaska, the National Marine Fisheries Service, and affected private land owners, shall prepare and transmit to the Congress a study containing recommendations on the need, if any, to standardize riparian management practices for Federal, State, and private lands within the Tongass National Forest." This study is currently under contract for completion.

Effects on Other Resources

Fish habitat, and its maintenance and enhancement, may complement or conflict with the production or capability of other resources. This section lists some of these potential interactions not covered in previous sections.

Cultural resources. Occasionally the location of fish habitat enhancement projects may coincide with the location of cultural resource sites. This may occur because early Alaskans and native people fished at sites that had high fish production or at waterfalls with fish barriers. Development of fish projects requires careful cultural reconnaissance to avoid any conflicts between the resources. Implementation of the Forest-wide direction and standards and guidelines (see Draft Proposed Plan) for cultural resources should result in no negative effects to the cultural resources. The effect of fisheries on cultural resources is not expected to change by alternative.

Recreation. Maintenance and improvement of fish resources generally has a complementary benefit on recreation. A number of fish improvement projects are specifically designed to improve fishing opportunities for Forest users. (See previous section on fish improvement.) The effects of fisheries on recreation are not expected to change by alternative.

Visual Quality. Maintenance and improvement of fish resources generally complements visual resource management. Forested areas retained along streams primarily to maintain fish habitat capability often enhance the visual condition. Improvement of fisheries in visually sensitive areas may lead to a reduction in visual quality where human-made structures are constructed. However, most of the time, fish habitat improvement projects can be constructed in a manner that will meet the allocated visual quality objective. Those alternatives with a Retention visual quality objective could have greater inherent conflict between visuals and fish. (See the section in this chapter on the visual resource.)

Wilderness. See sections on fish improvement and mitigation measures.

Subsistence. Maintenance and improvement of fish resources is of positive benefit to subsistence users. Improvement of fish habitats generally provides greater opportunities for the subsistence user. Since all alternatives maintain and improve fish habitats to the same degree, there are no differences anticipated between the alternatives.

Wildlife. Maintenance and improvement of fish habitats complement the needs of wildlife. Riparian areas in an unharvested condition provide habitat for wildlife species requiring aquatic habitats and, often, old-growth forest conditions. Greater numbers of fish provide increased food supplies for many fish-eating wildlife species, such as brown bear, black bear and eagles. Since all alternatives maintain or improve fish habitats to the same degree, there are no differences anticipated in the interaction between wildlife and fish between the alternatives.

Timber. The maintenance of fish habitat in riparian areas requires that parts of riparian areas not have timber harvest, or have reduced timber yields. Examples of harvest techniques prescribed in the Stream and Lake Protection Land Use Designation include single tree selection and group selection. Those alternatives with greater amounts of timber harvest also have more acres assigned to the Stream and Lake Protection or Fish Habitat and Water Quality Requirements Land Use Designations. Although timber harvest is not anticipated to reduce fish habitat capability in any alternative, larger harvests will increase the risk of impacts to fish. (See previous portions of this fish section.)

Water. In some instances, increased escapement of anadromous fish could decrease water quality in streams due to increased biological oxygen demand (BOD) of live fish, as well as the decay of adult spawned carcasses. The change in water quality is usually only a concern where the water is used as a domestic or hatchery water source. These potential effects will have to be analyzed during site-specific planning of fish improvement projects. Otherwise, maintenance of water quality complements optimum fish habitat capability requirements. No appreciable difference is anticipated between the alternatives since all alternatives have similar fish improvement and protection objectives.

Minerals and geology. Development of mineral resources may be restricted in order to maintain or improve fish habitat. ANILCA section 505 (a) states: "The Secretary of Agriculture shall ... maintain the habitats to the maximum extent feasible, of anadromous fish and other foodfish, and (to) maintain the present and continued productivity of such habitat when such habitats are affected by mining activities..." (parentheses and dots added). The effect of this section of ANILCA is the same between all alternatives.

Transportation. The goal to maintain or improve fish habitat capability results in increased costs of road construction and maintenance. Road crossings to maintain fish passage on anadromous fish streams and many resident fish streams require higher construction costs for oversized culverts or bridges. In the vicinity of fish streams, often full bench cut roads in hillsides are often required to prevent sediment from entering streams. Implementation of Best Management Practices may also lead to increased roading costs. These costs are expected to differ by alternative, and be proportional to the miles of road constructed. See Figure 3-31 for estimates of miles of roads to be built through the planning horizon. Forest-wide the largest numbers of roads would potentially be constructed in Alternative D, followed by Alternatives C, P, B, and A.

Air, soil, lands, facilities, fire, law enforcement, forest pests, and special interest areas. No effects of fish on air, soil, lands, facilities, fire, law enforcement, insect & disease, or special areas are anticipated due to implementation of any of the alternatives.

Mitigation

Three mitigation measures designed to maintain or improve fish habitat are common to all alternatives: Forest-wide standards for fish habitat, the Stream and Lake Protection or Fish Habitat and Water Quality Requirements Land Use Designation, and Best Management Practices (BMP's). One mitigation measure is specific to fish habitat improvement projects. In addition, monitoring, required in all alternatives (see Chapter 6 of the Proposed Revised Forest Plan), is designed to assess whether goals are being accomplished.

Forest-wide standards

Forest-wide standards for fish habitat apply across the Forest (see the Proposed Forest Plan), with few exceptions. The standards provide for the goal of maintaining and enhancing fish resources in Alternatives A,B,C and P, while, in Alternative D, the standards provide for the goal of maintaining and rehabilitating fish resources. Standards common to the alternatives include: 1) providing for short and long-term maintenance of fish habitat capability; 2) maintaining natural stream bank and stream channel processes; 3) maintaining natural and beneficial quantities of large woody debris over the short- and long-term; 4) maintaining water quality to provide for fish production; 5) maintaining or improving water temperatures at a level to optimize salmonid populations (maintain or rehabilitate water temperatures to a level suitable for salmonid populations in Alternative D); 6) maintaining or improving (rehabilitate in Alternative D) primary or secondary stream biological production in second-growth forests; and, 7) maintaining fish passage through stream crossing structures. Specific implementation guidelines to meet these standards are included in the Proposed Forest Plan and the Aquatic Habitat Management Handbook (FSH 2609.24), and would be applied during site-specific planning of projects.

Riparian Management Land Use Designations

Two Land Use Designations (LUD's) have been developed for use in the management of riparian areas. The Stream and Lake Protection Land Use Designation meets the requirements of all laws and regulations. Its emphasis is to maintain riparian habitat for fish and other

riparian-associated resources. In addition, for fish habitat, its protection, rehabilitation and improvement are emphasized. The Fish Habitat and Water Quality Requirements LUD also meets the requirement of all laws and regulations. However, its emphasis is to only meet the legal requirements for fish habitat, riparian areas and water quality. Alternatives A, B, C and P allocate only the Stream and Lake Protection LUD, while Alternative D allocates only the Fish Habitat and Water Quality Requirement LUD.

The riparian management LUD's are applied in those conditions where, normally, more development-oriented management would occur than prescribed in the riparian management LUD. For instance, a riparian management LUD is applied along all Class I, II or III streams, lakes, and riparian areas where the Timber Production LUD would normally be applied. In areas such as the Primitive Recreation LUD where management is normally less potentially impacting than could occur in a riparian management LUD, a riparian management prescription would not apply. For modeling purposes, a riparian management LUD was applied where the Timber Production, Scenic Viewshed, Modified Landscapes, Scenic River or Recreation River LUD's was the primary allocation. During Forest Plan implementation, however, with few exceptions, development would never be allowed that was more intensive than the riparian management LUD for the selected alternative. Examples of exceptions which may allow more intensive development include Experimental Forest management and minerals development.

The standards and guidelines for the riparian management area LUD's (see the Proposed Forest Plan, Chapter 3) were developed to recognize the unique values of riparian resources and to give preferential treatment to riparian-associated and dependent resources where management conflicts exist. The LUD is assigned a variable width streamside management area based on channel types, but always at least 100 feet wide on both sides of a stream. (Boundaries of the land use designation are described in Appendix B.)

The effects of the application of a riparian management prescription vary by channel type, but is the same among alternatives. Most low gradient streams and floodplains would have a wide no harvest zone, while moderate gradient and high gradient channels would have less protection from timber harvest. All alternatives meet the requirements of Section 103 of the Tongass Timber Reform Act, which includes a buffer zone with no commercial timber harvest within no less than 100 feet in width on each side of Class I streams (all anadromous fish streams and important resident fish streams), and on Class II streams which flow directly into Class I streams. Bank stability and large woody debris input would be maintained at natural levels on all low gradient channels. Moderate and high gradient channels with steep sideslopes would have some risk of bank disturbance and would likely have a decline in large woody debris recruitment. Because of narrower widths of no-cut or single-tree harvest areas in moderate and steeper slopes, there is some risk of catastrophic blowdown. Catastrophic blowdown provides woody debris to stream systems in one large pulse, rather than spread over a long period of time which is more often the case in systems with no timber harvest.

Shade-producing vegetation would be maintained along all streams in order to meet management objectives. Shade requirements would need to be developed on a site-specific project basis on streams without a no harvest area adjacent to the stream.

Class III streams would be provided with variable treatment. Some Class III streams would have narrow no harvest buffers, however many would be subject to clearcut harvest to the streambank. Potential cumulative effects of multiple activities are reduced by requiring: 1) a cumulative watershed effects analysis when large scale ground-disturbing activities and associated roading would be greater than 35 percent of a 3rd order or larger watershed in less than a 15-year period, and 2) in the high gradient contained process group (Class III channels),

the harvest rate along the streams will not exceed 25 percent of a 3rd order or larger watershed every 20 years. No harvest, or limited harvest buffers (such as using single tree or group selection harvest), would be provided wherever necessary to meet prescription objectives. Best Management Practices (BMP's) for streamside harvest would apply (see next section on BMP's).

Windfirmness of retained trees is achieved through selective harvest of adjacent timber, or where necessary, leaving more unharvested trees than the management prescription requires. The design and success of maintaining windfirm trees need to be developed on a site-specific project basis.

The overall effectiveness of the Fish and Water Quality Requirements and Stream and Lake Protection Land Use Designation prescriptions are modeled in the habitat capability models for the fish management indicator species. Use of the prescriptions are not anticipated to decrease the coho capability. Dolly Varden habitat capability would not decrease on any Class I streams, or on Class II streams that flow directly into Class I streams. There could be very slight reductions in capability due to timber harvest along other Class II streams for Dolly Varden. Any estimate of Dolly Varden reduction must be made at the site-specific project level when considering which Class II streams are managed for mandatory no commercial timber harvest 100 foot buffers, as required by the Tongass Timber Reform Act.

Application of the Stream and Lake Protection or Fish Habitat and Water Quality Requirements Land Use Designation prescriptions alone, would not necessarily provide for complete maintenance or enhancement of habitats, especially for the pink salmon Management Indicator Species. Pink salmon are dependent on high quality, stable spawning gravels. In order to provide for these conditions, Best Management Practices to protect water quality are applied across the Forest.

Best Management Practices

Best Management Practices (BMP's) are methods, measures or practices to prevent or reduce water pollution. Their use is required by the Tongass Timber Reform Act and the Clean Water Act. They include structural and nonstructural controls, operation and maintenance procedures, and scheduling and distribution of activities. Usually, BMP's are applied as a combination of practices, rather than a single practice.

The BMP's presented in the Best Management Handbook (FSH 2509.22, USDA Forest Service, 1991) were compiled from Federal Law, Forest Service manuals, handbooks, contract and permit provisions, policy statements, planning documents, regional guides, applicable state and local law and regulations and other pertinent sources. The site-specific application of these BMP's is conducted in an interdisciplinary mode, and involves consideration of: design standards and risks, environmental effects, practicality, and institutional, political, social, economic, and technical feasibility.

These BMP's are of three basic forms, (administrative, preventive and corrective) and are required on all projects which could potentially degrade water quality. BMP's establish a procedure which will result in the formulation of site-specific prescriptions for nonpoint source pollution control. BMP applications vary for different situations. No single practice, method, or technique is best in all circumstances. BMP's presented in this handbook include qualifiers as "according to design," "as prescribed," "suitable for," and "within acceptable limits." BMP applications are developed by natural resource professionals through interdisciplinary involvement. These applications are tailored to meet local resource and environmental requirements.

The environmental and technical aspects of site-specific application of BMP's follow widely accepted scientific principles. These principles are applied using the benefit of experience (both local and collective knowledge). In addition part of the BMP's process is monitoring and refinement. The refinement process tests the validity of applying the various scientific principles to differing environmental and management conditions and improves our local and collective knowledge base.

Appendix C of the Proposed Revised Forest Plan includes a listing of recommended Best Management Practices identified in the Handbook. For further discussion of the BMP's and watershed mitigation, refer to the sections on Soil and Water.

Aquaculture Development

ANILCA allows aquaculture development throughout the Forest. This may include areas of high visual sensitivity and Wilderness. An objective of Wilderness is to maintain natural ecosystems. Aquaculture developments will generally be designed to meet the visual quality objective. In some areas, such as in locations with retention visual quality objectives, construction of a project may not be possible without a minor variance in the objective. However, whenever possible, facilities shall be constructed of materials which blend with, and are compatible with, the immediately surrounding landscape.

In order to mitigate the effects of aquaculture development in Wilderness, an analysis of suitability of fish habitat enhancement will be made during project planning. This analysis will evaluate:

- the availability of suitable non-wilderness opportunities,
- the effects on wilderness conditions, in general,
- the effects on wilderness ecosystems and desired solitude level due to an enhanced fishery resulting in increased recreation use,
- the effects on ecosystems due to the introduction of species not indigenous to the watershed, and
- the appropriateness of structures both in type and scale to the Recreation Opportunity Spectrum Class (ROS) setting.

For projects in Wilderness which require construction, developments shall involve those facilities essential to operations (of facilities) and shall be constructed in such rustic manner as to blend into the natural character of the area. Land disturbing activities necessary for construction will be temporary. It is anticipated that approximately 10 percent of fish improvement projects will be located in Wilderness.

Forest Pests

Affected Environment

Changes Since the DEIS

One insect species, the black-headed budworm, has been added, and also a section on animal damage. Information on other insects and diseases has been updated. The section has been renamed Forest Pests (formerly called Insects and Diseases).

Background

The role of Forest Pest Management (in State and Private Forestry) is to work with Federal, State, local, Native, and corporate land managers and private landowners to manage forest pest activity within acceptable levels. Each year, Forest Pest Management personnel conduct aerial surveys on 30 million acres of National Forest and adjacent lands in Alaska. These surveys are supplemented by ground investigations to identify and quantify pest outbreaks. This work, as well as subsequent prevention and control measures, is accomplished in cooperation with the various land managers.

Current Situation

Some of the more common and most destructive insects and diseases of Southeast Alaska are:

Black-Headed Budworm, *Acleris gloverana* (Wals) is one of the most destructive forest insects in coastal Southeast Alaska. In the 1950's, almost one-third of the net timber volume was lost on many hemlock sites due to budworm defoliation. Localized outbreaks continue to occur throughout the hemlock type. Larval feeding strips hemlock foliage and can cause growth reduction, top-kill, and, at times, tree mortality.

Hemlock Sawfly, *Neodiprion tsugae* (Middleton) is a serious defoliator of western hemlock throughout Southeast Alaska. Outbreaks tend to be of longer duration in southern Southeast Alaska where widespread damage is usually confined to thc area south of Frederick Sound especially along Clarence Strait. Larvae feed on mature (older) rather than current year (new) foliage. Most sawfly outbreaks do not cause tree mortality, but the tops are killed in some trees and tree growth may be reduced.

Spruce Beetle, *Dendroctonus rufipennis* (Kirby) is the most destructive forest insect in Alaska. In the last 25 years, outbreaks have resulted in estimated losses of 300 million board feet (MMBF) of timber. Spruce beetle outbreaks in Southeast Alaska have typically been smaller and of shorter duration than those in south/central and interior Alaska. Weather conditions appear to play a role in the expansion or contraction of beetle populations. Spruce beetle activity has been noted across the Tongass National Forest and adjacent lands from Yakutat Forelands to Dall Island.

Most outbreaks originate in blowdown or logging residuals (cull logs) and spread to adjacent standing timber. Mortality in unmanaged Sitka spruce stands varies and can be as high as 75 percent.

Hemlock dwarf-mistletoe, *Arceuthobium tsugense* (Rosendhal, G. N. Jones) is a destructive disease of western hemlock throughout Southeast Alaska as far north as Haines. It is absent further west along the coastal area of the Gulf of Alaska. In Southeast, infestation levels vary in old-growth hemlock stands. Dwarf-mistletoe is absent in some stands; in other stands almost every hemlock is infected. The volume of western hemlock trees heavily infected with dwarf-mistletoe can be reduced as much as 50 percent over a 100-year period. Dwarf-mistletoe is species-specific: Sitka spruce and mountain hemlock are rarely infected.

The spread of dwarf-mistletoe in young hemlock stands is often the result of leaving standing infected hemlock in cutover areas (Shaw, 1982; Shaw and Hennon, 1991). Dwarf-mistletoe responds to light with increased seed production. Rates of spread to adjacent and lower canopy trees may increase in partial cuts where hemlocks remain.

Alaska Yellow-Cedar Decline and mortality of Alaska yellow-cedar continues to be one of the most widespread and important forest problems in Southeast Alaska. Aerial surveys have mapped some 400,000 acres of decline. This decline is associated with wet, poorly-drained sites, and recent research has demonstrated that no organism is the primary cause of decline (Hennon, et al., 1985; Hennon 1990; Hennon, et al., 1990(d)). Since it is not contagious, Alaska yellow-cedar decline will not spread to sites where it is not found now (Hennon, et al., 1990b).

Since Alaska yellow-cedar has high timber value, this annual mortality results in a significant loss of that value. In addition, substantial acres of old-growth cedar forests have been harvested and are regenerating to other species; thus, specific cedar regeneration efforts are needed.

Hemlock Fluting. Hemlocks with fluting have deeply incised grooves and ridges extending vertically along their trunks, a condition which reduces the value of hemlock logs because they yield less sawlog volume and because some of the milled wood contains bark. Fluting continues to be a problem throughout Southeast Alaska. Researchers have recently explored reasons for this trunk deformation and have documented its presence in young hemlock stands.

Decays. Aside from the Alaska yellow-cedar decline, stem and root decays are the major disease problems in Southeast Alaska. Stem decays cause substantial loss in all tree species in unmanaged stands. Many decay fungi enter through tree wounds. The accidental wounding of trees during partial cuts and commercial thinnings will invariably increase the impact from decay organisms in managed stands.

Animal Damage. Significant animal damage to trees is apparent at various locations across the Tongass National Forest. Porcupine feeding on hemlock and spruce is common on Mitkof Island and many mainland areas. Young trees in managed and unmanaged stands are often top-killed or killed outright as porcupine feeding girdles the main bole. This damage becomes significant when groups of trees are killed or deformed. Porcupines also cause basal wounds on older trees which serve as entry points for decay fungi.

Brown bears cause basal wounds on Alaska yellow-cedar each spring on Baranof and Chichagof Islands. More than half of the trees in some stands have received large wounds. These wounds serve as entry points for decay fungi.

Future Trends

In the future, forest pest activity will continue in both managed and unmanaged stands. The severity of such activity will vary depending on the pest organism, the affected resources, and the overall management objectives. In general, insects such as the spruce bark beetle will likely have minimal impact on immature second-growth spruce stands. This scenario will change as the same spruce stands approach maturity. Damage by such organisms as defoliating insects and porcupines can be expected to be increasingly evident among young-growth stands. Stem decays and root diseases have historically increased with intensified land management activities. Mortality and wood volume loss from both hemlock dwarf-mistletoe and wood decay fungi can be expected to increase in stands that receive partial cuts or commercial thinning.

Methodology and Scientific Accuracy

Forest pest activity on the Tongass National Forest is typically detected during on-the-ground activities, or during annual aerial surveys conducted by the region's Forest Pest Management (FPM) group. The timing of surveys coincides with foliage and pest development. Pest activity noted during surveys is documented and reported to the appropriate land manager. In cooperation with land managers, FPM people conduct on-site investigations to verify the pest, to evaluate the pest and its host(s), and to formulate future management alternatives. Often, pest and host monitoring is required to fully understand potential impacts prior to development of management alternatives.

Populations of historically significant defoliating insects are monitored through a sampling system that occurs in conjunction with the annual aerial survey. Defoliating larvae are collected, identified and counted at designated sites. This data in conjunction with future collection of host and weather information will greatly enhance FPM's ability to predict defoliator damage.

The impact of hemlock dwarf-mistletoe and methods of reducing damage from the disease in managed stands have been established by several research studies (cited above). In addition, Forest Pest Management has surveyed numerous even-aged stands from 10 to 100 years old to determine the incidence and impact of hemlock dwarf-mistletoe in managed stands.

A series of research studies have yielded information on the pathology and epidemiology of decline of Alaska yellow-cedar (cited above; see also Hennon, et al., 1990(a); Hennon, et al., 1990(c)). In addition, information on the distribution of decline and acreage affected has been determined by mapping during aerial surveys.

Porcupine damage in managed stands is currently being assessed by two Forest Pest Management studies: an intensive sampling every six months of plots in young stands on Mitkof Island where damage was known to be heavy (Eglitis and Hennon, 1986), and an extensive sampling of young-growth stands from 10-100 years old located throughout Southeast Alaska.

With continued harvest of mature timber stands on the Tongass National Forest, forest pest research will begin to focus on pest activity within second-growth stands. This research will be conducted in cooperation with the Pacific Northwest Research Station.

Forest Pests

Environmental Consequences

Direct, Indirect and Cumulative Effects

The health of a forest can be evaluated by a number of different standards, each related to a management objective for the forest. Specific pests will be affected differently by each of the different management alternatives. In general, increasing timber harvesting (Alternative D) will decrease the impacts of spruce beetle and timber volume loss by pests such as wood decay fungi and hemlock dwarf mistletoe. From the perspective of timber production, therefore, the health of these forests is enhanced by timber harvesting. However, because many of these pests contribute significantly to ecosystem diversity and long-term stability in old-growth stands by providing increased canopy diversity and animal habitat, and by causing the formation of small scale gaps (Alternative A), these same pests can be perceived to be enhancing forest health. Thus, from the viewpoint of biodiversity, increased levels of clearcut harvesting of old-growth stands will reduce the role of these pests in contributing to forest health.

In general, endemic levels of insect and disease activity in mature and overmature forests will be allowed to run their course. Tree losses will be accepted, yet harvesting flexibility will be maintained to take advantage of timber salvage opportunities. Pest suppression may be justified in high quality, mature to overmature stands that cannot be salvaged immediately, or that lie near recreation areas and communities where scenic values are high.

Presently, Alaska yellow-cedar has the highest market value of the commercial timber species of the Tongass. Although it occupies only a fraction of forested lands, it has the potential to be an important factor in the overall market value of individual timber sales. Continuing research leading to the reason for Alaska yellow-cedar decline could have a positive effect on future timber values.

Animal damage, such as that from porcupines, is expected to continue and will likely be increasingly evident in precommercially-thinned stands where porcupines are present. Winter feeding by porcupines is known to damage and sometimes kill young trees in both managed and unmanaged stands.

Mitigation

Integrated pest management is the key to achieving a desired forest health condition. Integrated pest management is an approach to reducing pest damage to tolerable levels through a variety of techniques, including: no action, predators and parasites, genetically resistant hosts, environmental modifications, and, when necessary and appropriate, chemical pesticides. State-of-the-art integrated pest management emphasizes modification of the natural environment through silviculture (prevention rather than suppression).

The ultimate goal of silviculture in integrated pest management is the creation of plant diversity both in species mix and in age distribution. Plant diversity provides the greatest opportunity for ensuring a healthy forest. Most insects and diseases are host-specific, or depend upon plants which are under stress. Therefore, increasing species and age class, and structural diversity will decrease losses caused by insects and diseases (with the exception of dwarf mistletoe and some decay fungi), and in turn reduce their impacts. Diversity can be influenced through processes outside the control of the land manager (such as windthrow, wildfire or landslides), or purposefully directed by the land manager. Through the silvicultural prescription process, stands with unacceptable pest-related losses as well as those of high risk for future losses should be identified for treatment.

Because of the vastness and remote character of much of the Tongass, the true impact of many pests is not known. Research and periodic surveys are continuing to identify and quantify these impacts.

Lands

Affected Environment

Changes since the DEIS

State selection data has been updated since publication of the DEIS. An additional 1,026 acres have been conveyed to the State of Alaska. In August 1990, Congress passed the Admiralty Island National Monument Land Management Act of 1990. This is discussed in the text. Hydroelectric site information has been updated, and information from the Alaska Department of Transportation and Public Facilities on the Juneau access alternatives has been included.

Current Situation

Special Use Administration

In Fiscal Year 1989 there were 507 non-recreation special use authorizations on the Tongass National Forest. Most of these (59 percent) were for industrial uses such as commercial fishing camps or for transportation uses such as roads. Another type, electronic sites, will be analyzed to determine geographic areas of coverage within the Forest. This study will identify areas of electronic signal coverage for existing and proposed electronic sites, and it will identify areas where the coverage is lacking which may require additional future sites. This study will use computer modeling with the assistance of the U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA, undated). Although this study will not directly designate new electronic sites, it will provide data for follow-up site-specific analyses which may result in the designation of future electronic sites.

Land Ownership Administration

State Selections. The Alaska Statehood Act of 1959, Section 6a, authorized the State of Alaska to select 400,000 acres of vacant and unappropriated land from within National Forests in Alaska, for furthering the development and expansion of Alaskan communities. The Alaska National Interest Lands Conservation Act of 1980 (ANILCA), Section 906, provides that the State has until 1994 to complete its selections, and that the State may select lands 25 percent in excess of its remaining entitlement. Only the actual entitlement will be conveyed from these selections.

As of January 29, 1991, the State had received title to approximately 226,003 acres (or 57 percent) of their 400,000 acre entitlement. Of the 226,003 acres conveyed to the State, 159,114 acres (or 70 percent) are located on the Tongass National Forest. The State has completed its National Forest selection process and applied for all remaining entitlement. Most of the land requested by the State has been approved by the Forest Service. If the State relinquishes some acres and replaces them with selections in other locations prior to the 1994 deadline, minor changes may occur.

Native Selections. The Alaska Native Claims Settlement Act of 1971 (ANCSA) provided for conveyance of the surface estate to 23,040 acres of land to each of the ten Native village corporations and two urban corporations located in Southeast Alaska. The Regional Corporation, Sealaska, was to receive additional acres of surface lands, with the subsurface of lands conveyed to the village and urban corporations. Native individuals were entitled to up to 160 acres if they could demonstrate that they occupied the land as a primary place of residence on August 31, 1971. Some additional acres have resulted from land exchanges directed in ANILCA to help preserve the natural and recreational values of Admiralty Island National Monument, while still protecting the rights of the Natives involved.

To allow Native corporations to meet selection deadlines established by ANCSA, USDI Bureau of Land Management Regulations (43 CFR 2651-2653) authorized Native corporations to select lands in excess of their entitlement; however, when conveyances are completed only the entitlement will be conveyed to each Native corporation.

ANCSA (as modified by ANILCA) provides that a total of approximately 597,306 acres of land be conveyed to Natives from the Tongass National Forest. As of February 22, 1991, approximately 521,978 acres (87 percent) of these acres had been conveyed, leaving approximately 75,328 acres remaining to be conveyed. The Tongass Land Management Plan accounted for 575,133 acres of Native entitlement. This figure overestimated the future available Tongass National Forest landbase by 22,173 acres. For additional information on Native selection rights, see Chapter 3, "Lands," in the Analysis of the Management Situation (Tongass National Forest, January 1990).

Native Allotments. The Alaska Native Allotment Act of 1906 provided for Native individuals who had occupied lands prior to the land's designation as National Forest to apply to the Bureau of Land Management for conveyance of up to 160 acres, under conditions prescribed by the Act and Federal Regulations. ANCSA, Section 18(a), repealed the Native Allotment Act with the provision that allotment applications submitted prior to enactment of ANCSA (December 18, 1971) could still be processed.

Within the Tongass National Forest, as of April 11, 1989, there have been 174 acres of land conveyed under this authority. Another 122 applications await adjudication by the Bureau of Land Management (BLM). Applications still pending adjudication by BLM are considered active claims and restrict Forest Service management activities within the area claimed.

Land Ownership Adjustments

The Haida Land Exchange Act of 1986, Section 10, provides Haida Corporation the option to exchange lands, known as "Haida Exchange Lands," for other National Forest System lands after January 1, 1995. Haida Corporation has informed the Forest Service of their intent to exchange for approximately 8,670 acres of surface estate under this authority at the Portage/Sulzer area, in Cholmondeley Sound, Prince of Wales Island.

The Haida Land Exchange Act, Section 4, provides Sealaska Corporation the opportunity to exchange their subsurface estate in certain lands, for lands or interests in land, elsewhere, of equal value. Sealaska Corporation has elected to exchange approximately 5,440 acres of its subsurface to the Forest Service, in return for lands or interests in land of equal value, at an undetermined location which is subject to Forest Service concurrence.

In August 1990, Congress passed the Admiralty Island National Monument Land Management Act of 1990. This Act had two purposes. Title I provides for the enrollment of 20 individuals as Natives, to receive benefits under the Alaska Native Claims Settlement Act of 1971 (ANCSA). The purpose of Title II is to improve the federal management of lands on Admiralty Island. The Act authorizes and directs the Secretary of Agriculture to enter into agreements with Kootznoowoo, Inc., for land acquisitions deemed necessary by the Secretary to carry out the purposes of this Act or the Alaska National Interest Lands Conservation Act of 1980. Lands at Cholmondeley Sound, on Prince of Wales Island, were made available for exchange between the United States and Kootznoowoo, Inc. There are requirements for status reports to Congress and for lands acquired to become part of the Admiralty Island National Monument. Admiralty Island National Monument Wilderness was changed in name to Kootznoowoo Wilderness and litigation between the United States and Kootznoowoo, Inc., related to an administrative site at Angoon, was resolved.

In implementing Congressional intent of this Act, the Forest Service has been negotiating with Kootznoowoo, Inc. for the exchange of several inholdings of non-federal property on Admiralty Island and Prince of Wales Island, in exchange for federal property of approximately equal value on Prince of Wales Island. The lands being negotiated do not include non-federal lands at Cube Cove or federal lands at Greens Creek.

Transportation and Utility Systems (TUS)

Transportation and Utility Systems (TUS) are usually major right-of-way corridors and their associated sites. The rights-of-way are granted by the Forest Service. These systems include roads designated as State and Federal Highways, powerlines 66 kV or greater, and pipelines 10 inches or more in diameter. Water pipelines greater than 10 inches are included if they are a public utility (i.e., if they service a community water supply). The transportation section of this chapter contains additional information on transportation facilities.

The current Tongass Land Management Plan provides the following goals related to transportation and utility systems:

- Hydroelectric Power. The goal is to facilitate the development of hydroelectric power sites with identified high development potential by managing those sites, and their attendant transmission corridors, in ways which will allow development of these facilities with due consideration of the other various resources.

- Road Corridors. The goal is to insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study be managed to allow their development with due consideration of the other various resources.

Recognizing potential TUS corridors and sites, and preserving future options, making development easier if such facilities are needed in the future. A list of currently identified potential TUS corridors and sites is located in Chapter 3, “Lands” of the Analysis of the Management Situation (Tongass National Forest, January 1990).

Since publication of the Analysis of the Management Situation, the Alaska Power and Telephone Company has identified an additional potential hydroelectric site at Dayebas Creek, which could provide power for Haines and vicinity. Also available since publication of this document, is a scoping report from Alaska Department of Transportation and Public Facilities (March 1990) which discusses the following Juneau access alternatives: 1) East Lynn Canal; 2) West Lynn Canal; 3) Taku River to Atlin, B.C.; 4) improvements to the Alaska State Ferry System; and, 5) no action. The study is ongoing and decisions are deferred to a forthcoming Environmental Impact Statement.

Lands

Environmental Consequences

Direct, Indirect and Cumulative Effects

Existing policies and guidelines for special use management are not always specific enough for consistent management decisions between the Tongass National Forest's administrative units. The proposed Forest-wide Standards and Guidelines (Proposed Revised Forest Plan, Chapter 4) will provide more specific direction to supplement the existing Forest Service Manual policies.

Special Use Administration

Existing and proposed electronic sites within the Forest will be analyzed to determine geographic areas of electronic signal coverage and areas where coverage is lacking which may require additional sites. Although this study will not directly result in the designation of new electronic sites, it will provide data necessary for follow-up site-specific analyses which may result in the designation of future electronic sites. It will help meet the needs of industry by identifying areas where site coverage is inadequate and where additional sites are needed. No new sites will be designated without a disclosure of environmental effects in a documented site-specific analysis.

Land Ownership Administration

Due to lands being selected by the State of Alaska, Native corporations, and Native individuals, the land base may change. Future adjustments to certain resource programs may be needed. Most likely to be affected are: 1) the allowable sale quantity for timber harvest; 2) internal boundary maintenance programs; and 3) programs dependent upon access to public lands.

The State will receive an additional 173,997 acres, largely from lands currently selected under the Alaska Statehood Act within the Tongass and Chugach National Forests. Native corporations and individuals will receive approximately 75,328 additional acres from lands selected under the Alaska Native Claims Settlement Act of 1971 (ANCSA), and Native individuals could receive almost 12,000 additional acres in Native allotments from lands applied for under the Alaska Native Allotment Act of 1906.

In addition to the lands the State and Natives will receive, in fee title, many other areas are encumbered by selections which restrict Forest Service management. There is no time limit for conveyance of the Native lands.

Land Ownership Adjustments

Land adjustments resulting from the Haida Land Exchange Act of 1986 are not final, and not yet ready for analysis. Some are the result of legislative action which is binding and not discretionary on the part of the Forest Service.

Transportation and Utility Systems

Table 3-38 displays the acres of Transportation and Utility System (TUS) "Windows" and "Avoidance Areas" by alternative. A TUS Window is an area potentially available for the location of transportation or utility corridors and sites. Windows represent areas of future opportunity where the applied management direction will not conflict with future designation of a TUS. A site-specific analysis is still required during project-level planning, to identify resource protection needs within these areas.

A TUS Avoidance Area is an area where the establishment and use of transportation or utility corridors and sites is not desirable given the land use designation. A search for windows

should be exhausted before TUS facilities are considered in Avoidance Areas. When practical, Avoidance Areas should be avoided through site-specific analysis during project-level planning. Avoidance Areas include Congressionally and administratively designated areas including Wilderness. Although special environmental or procedural considerations may be required for these Congressionally or administratively designated areas, their designations do not preclude consideration and use as a TUS.

Windows and Avoidance Areas are designated through the allocation of lands to land use designations specifically identified as TUS Windows or a TUS Avoidance Areas in their standards and guidelines.

Table 3-38

Acres of Transportation and Utility System windows and avoidance areas

Alternative	Windows	Avoidance Areas
A	3,589,288	13,407,969
B	4,228,319	12,768,939
C	5,030,065	11,967,193
D	7,427,973	9,569,284
P	5,175,455	11,821,803

Source: Revision data base, June 5, 1991, query 55872

The development of transportation or utility corridors is not precluded anywhere under any alternative. Alternative D has the greatest potential to readily accommodate Transportation and Utility Systems and Alternatives A and B have the least potential. This is because of the larger number of acres designated as TUS Windows in Alternative D and the fewer acres in Alternatives A and B. Future Transportation and Utility Systems may be constructed through both Windows and Avoidance Areas; however, TUS construction through Avoidance Areas will take place only after a search for Windows has been exhausted. For further information regarding management direction for Windows and Avoidance Areas, see the Forest-wide Standards and Guidelines, Lands Special Use Administration Section, in the Proposed Revised Forest Plan (Chapter 4).

Minerals

Affected Environment

Changes Since the DEIS

The changes in land designations (Wilderness and LUD II) brought about by the Tongass Timber Reform Act have been incorporated, and the analysis changed to reflect them. The USGS inventory and report on undiscovered locatable mineral resources is now available, and information from it has been included. An error in the estimated molybdenum reserves for Quartz Hill has been corrected, and the calculations of amount and value for Quartz Hill have been redone.

Background

The Forest Service recognizes that minerals are fundamental to the Nation's well-being, and as policy encourages the exploration and development of the mineral resources it manages. The Secretary of Agriculture has provided regulations (36 CFR 228) to ensure surface resource protection, while encouraging the orderly development of mineral resources on National Forest System lands.

A wide variety of mineral deposit types and mineral resources occur within the boundaries of the Tongass National Forest. Examples of some of these mineral resources are gold, silver, molybdenum and uranium, as well as nationally-designated "strategic" and "critical" minerals such as lead, zinc, copper, tungsten and platinum group metals. Strategic and critical minerals are defined, by the Strategic and Critical Materials Stock Piling Act of 1979, as those necessary to supply military, industrial, and essential civilian needs during a national defense emergency, and not found or produced in the United States in sufficient quantities to meet emergency needs.

Mineral resources are legally divided into three groups: locatable minerals, leasable minerals, and salable minerals. The authority of the Forest Service to influence and regulate the exploration, development, and production phases of mining operations varies with each group. As a result, the Forest Service manages mineral resource programs that are specific to each group of minerals.

Locatable Minerals

A locatable mineral is any mineral which is "valuable," in the usual economic sense, or has a property that gives it distinct and special value. Examples of some locatable minerals on the Tongass National Forest are gold, silver, copper, molybdenum, iron, nickel, lead, zinc, and uncommon varieties of limestone and marble.

Every citizen of the United States has a statutory right, granted under the General Mining Law of 1872, as amended, to prospect and explore public domain lands open to mineral entry. The right of access is guaranteed by the Mining Law and is not at the discretion of the Forest Service. Upon discovering a valuable mineral deposit, citizens have the right to locate a mining claim and remove the mineral resources. The citizen holding a mining claim is called the claimant. The claimant is responsible for initiating mining activities and investing the capital required to conduct mineral exploration, site development, mine operation, and reclamation of the site.

By law, designated Wilderness, National Monuments, and other withdrawn areas are closed to mining claim location. These withdrawn areas, however, are subject to mining claims with valid existing rights established before the date the areas were withdrawn from mineral entry. As a consequence, some mining claims located within existing or proposed withdrawn areas could be developed in the future. Before mining operations in a withdrawn area are approved,

a mineral validity examination is conducted for each claim by a certified Forest Service mineral examiner to determine if there are valid existing rights established under the General Mining Law of 1872.

The Forest Service works with claimants to provide reasonable access to their claims, minimize adverse environmental impacts on surface resources, and ensure reasonable reclamation of disturbed lands affected by mining operations. Protection of surface resources is accomplished by reviewing the mining Plan of Operations submitted by the claimant, disclosing impacts of the proposed mining operations in a site-specific environmental document, approving only those activities specified in a Plan of Operations that are reasonably necessary for the proposed operation, monitoring mining operations to ensure environmental standards specified in the Forest Plan and approved Plan of Operations are met, and ensuring prompt and reasonable reclamation of disturbed areas.

Locatable supply. Southeast Alaska has a long history of mineral prospecting and mining. The first mineral location in Southeast Alaska was recorded in 1867 by a Russian trader near New Kasaan on Prince of Wales Island. In 1880, gold was discovered in placer gravels near Juneau. This discovery sparked keen interest and, by the turn of the century, dozens of mines were in production from the Juneau Mining District to the Ketchikan Mining District. Mining remained active until World War II. From the close of World War II to the mid-1970's exploration and mineral production in Southeast Alaska remained low compared to the activity documented at the beginning of the century. Prospecting and exploration generally increased during the mid-1970's, in part due to the Quartz Hill/Greens Creek discoveries, improved metal prices, technological advances, and the deregulation of gold. Metal prices have continued to improve since the mid-1980's, resulting in increased exploration and renewed interest in precious metals, mainly gold.

Most estimates of mineral resource potential use a format recognized and developed by the U.S. Bureau of Mines and the U.S. Geological Survey (USBM and USGS, 1980). Mineral resources are divided into identified resources (the primary responsibility of the U.S. Bureau of Mines) and undiscovered resources (the primary responsibility of the U.S. Geological Survey).

Identified locatable minerals. The gross metal value of identified mineral resources was estimated for the Tongass National Forest by the U.S. Bureau of Mines (Coldwell, 1990). The emphasis of this report was on critical and strategic minerals and those deposits likely to be developed in the next 10 to 15 years. In this report, the U.S. Bureau of Mines analyzed 171 identified mineral deposits across Southeast Alaska, 148 of which were located within the Tongass National Forest. Each deposit located in the Tongass was assigned to a mineral deposit model (after Berg, 1984), and further grouped into 52 mineral activity tracts. Tonnage and grade were determined for each mineral deposit based on published identified resources or were calculated using statistical tonnage and grade models developed by Cox and Singer (1986). The identified gross metal values were calculated by combining the tonnage and grade figures with U.S. Bureau of Mines commodity prices generated from average price trends over the period 1978-1987 for each commodity (1988 dollars).

The total gross in-place metal value of identified mineral resources for Southeast Alaska is estimated to be 1.32 trillion dollars (USBM, 1990). The total gross in-place metal value of identified mineral resources for the Tongass National Forest is estimated to be $37.1 billion dollars. Table 3-39 displays the identified gross metal values, by commodity, for the Tongass National Forest in 1988 dollars.

Table 3-39

Gross metal values of identified mineral resources on the Tongass National Forest

Commodity	In Situ Identified Resources		Dollars (1988)
Barite	266,000	tons	$ 10,391,000
Beryllium[1]	8,640,000	lbs	1,760,692,000
Cobalt[1]	9,680,000	lbs	64,856,000
Columbium[1]	96,884,000	lbs	284,839,000
Copper[1]	452,628,000	lbs	416,418,000
Gold	4,954,000	tr oz	2,261,369,000
Iron	193,045,000	tons	12,711,989,000
Lead[1]	484,678,000	lbs	184,178,000
Molybdenum	2,520,042,000	lbs	14,414,640,000
Nickel[1]	151,244,000	lbs	431,044,000
Palladium[1]	122	tr oz	17,000
Platinum[1]	1,350	tr oz	680,000
Rare Earth Oxide	230,151,000	lbs	1,300,351,000
Silver[1]	105,841,000	tr oz	1,225,636,000
Tantulum[1]	2,995,000	lbs	172,563,000
Thorium[1]	26,367,000	lbs	116,805,000
Tungsten[1]	420,000	lbs	667,000
Uranium	11,729,000	lbs	195,284,000
Vanadium[1]	7,500,000	lbs	30,750,000
Yttrium	133,082,000	lbs	830,432,000
Zinc[1]	1,407,428,000	lbs	661,406,000
Zirconium	624,220,000	lbs	53,683,000
Total			**$37,128,690,000**

Source: Coldwell, 1990.

[1] These commodities are designated critical or strategic minerals by the U.S. Bureau of Mines (1983).

Undiscovered locatable minerals. The gross metal value of undiscovered mineral resources was estimated for the Tongass National Forest by the U.S. Geological Survey (Brew, 1990). Their report estimates the undiscovered locatable mineral resource endowment of the Tongass National Forest, which covers about 80 percent of southeastern Alaska. Regional geologic, economic geologic, geochemical, geophysical, and mineral exploration history information for the region have been integrated to define 83 tracts, wholly or partially within the Tongass National Forest, that are permissive for the occurrence of undiscovered locatable mineral resources.

Estimates of the undiscovered mineral resource endowment were made using probabilistic methods. Each individual tract is judged to contain one or more different types of mineral deposits. Each type of deposit may contain one or more metallic elements of economic interest. For tracts where available information was judged to provide a sufficient basis, the number of as-yet undiscovered deposits of each type discoverable by conventional mineral exploration methods was estimated for each tract at the 0.95, 0.90, 0.50, 0.10, and 0.05 probability levels.

The estimates of the numbers of undiscovered deposits in each tract were used in combination with the world-wide grade and tonnage for each deposit type to calculate a probabilistic undiscovered mineral resource endowment for each tract by means of the U.S. Geological

Survey MARK3 mineral resource endowment simulator. By Monte Carlo simulation, this program produces a distribution of tonnages for each metal contained in each deposit type in a given tract. The mean unconditional tonnage figure for each metal was used in the analysis. When aggregated over all deposit types, these distributions yield a probabilistic estimate of the undiscovered mineral resources in each tract.

The estimates displayed below in Table 3-40 do not include the metal contained in all of the mineral deposits inferred to occur in the Forest; this is because there are no world-wide tonnage and grade models for several of the deposit types. These estimates were converted to gross metal values using commodity prices based on U.S. Bureau of Mines averages for the decade 1978-1987 (1988 dollars). These commodity prices are the same as those in Table 3-36 above (Identified Mineral Resources).

Table 3-40

Gross metal values of undiscovered mineral resources on the Tongass National Forest

Commodity	In Situ Undiscovered Mineral Resources	Dollars (1988)
Antimony	137,000 lbs	$ 226,000
Cobalt	223,000 lbs	1,490,000
Copper	7,430,000,000 lbs	6,840,000,000
Gold	3,860,000 tr oz	1,770,000,000
Iron	70,200,000 ton (st)	4,620,000,000
Lead	1,550,000,000 lbs	588,000,000
Molybdenum	760,587,000 lbs	4,350,000,000
Nickel	50,300,000 lbs	143,000,000
Palladium	158 tr oz	21,400
Platinum	46 tr oz	23,000
Rare Earth Metals	287,000,000 lbs	1,610,000,000
Silver	174,000,000 tr oz	2,000,000,000
Thorium	337,000,000 lbs	1,490,000,000
Tin	399,000,000 lbs	3,430,000,000
Tungsten	5,510,000 lbs	8,650,000
Uranium	5,600,000 lbs	93,000,000
Zinc	2,950,000,000 lbs	1,380,000,000
Total		**28,300,000,000**

Source: Brew, 1990

The above quantities and values represent the total undiscovered locatable mineral endowment of the Tongass National Forest, including those lands currently withdrawn from mineral entry, such as wilderness areas, and monuments.

Locatable demand. Minerals are used each day by everyone; our culture and society are dependent on their use. Without mining and minerals we would not have modern fishing or logging equipment, airplanes or automobiles, computers, telephones or televisions. The average color television set contains 35 different minerals, from copper to yttrium. All of these minerals must be removed from beneath the surface of the earth using modern mining methods.

Demand for mineral resources can be inferred based on the amount of money spent by the mining industry to prospect and explore for mineral resources in Southeast Alaska. Increases in the amount of money spent on exploration reflect an increase in demand for mineral resources.

Between 1981 and 1989 the mineral industry spent an average of 9.34 million dollars per year on mineral exploration in Southeast Alaska. In 1989 the mining industry spent 25.01 million dollars on exploration, creating approximately 47,586 person days of work (Bundtzen, et al., 1990). Table 3-41 illustrates the reported expenditures between 1981 to 1989 for exploration activities in Southeast Alaska (Bundtzen, et al., 1990). The table is based on a survey by the Alaska State Department of Geological and Geophysical Surveys, who mailed 933 questionnaires on mining activity in Alaska to private firms and individuals in the mining industry, 175 of which were returned. The figures, therefore, represent reported expenditures only.

Table 3-41

Reported expenditures for exploration activities in Southeast Alaska, 1981-1989

Year	Dollars[1]
1981	$20,940,000
1982	1,520,000
1983	1,950,000
1984	2,870,000
1985	2,530,000
1986	2,750,000
1987	5,850,000
1988	20,640,000
1989	25,010,000
Total	**$84,050,000**

Source: Bundtzen, et al., 1990

[1] These dollar values are uncorrected. The values expressed are those of the year indicated.

Demand for mineral resources can also be inferred by modeling the economic viability of identified mineral resources. Identified mineral resources with high degrees of economic viability will reflect an increase in mineral-related activities or in demand for those resources by industry.

The economic viability of 148 mineral deposits located within the Tongass National Forest were modeled by the U.S. Bureau of Mines (Coldwell, 1990). The modeling analysis compared the gross metal value of the identified mineral resources estimated for each deposit with the estimated capital and operating costs of the mine, mill, and infrastructure required to remove the mineral resources. The U.S. Bureau of Mines model considered location and number of existing claims, mineral occurrences, mineral terranes, mineral deposit models, regional and deposit geology, market price projections, mining models to extract minerals, pre-tax present net value (PNV) at zero percent discounted cash flow rate of return (DCFROR), after-tax PNV at four percent DCFROR, sensitivity to increased metal prices, critical or strategic designation, and current commodity interest by industry.

Fifty-two mineral activity tracts were classified by the U.S. Bureau of Mines as having a high potential for experiencing mineral exploration or development activity during the next 10 to 15 years. The mineral activity tracts were ranked 1, 2 or 3 based upon the following criteria:

- Rank 1. Mineral activity tracts mapped with a ranking of 1 would have at least one deposit with a positive, after-tax present net value (PNV) at four percent discounted cash flow rate of return (DCFROR) and/or would contain at least one active gold deposit.
- Rank 2. Mineral activity tracts of ranking 2 would have at least one deposit with a positive pre-tax PNV at zero percent DCFROR and/or contain at least one deposit with critical and strategic minerals.
- Rank 3. Mineral activity tracts of ranking 3 would have deposit areas with insufficient reserve estimates to perform a reliable PNV economic analysis. It would not contain any deposits with critical or strategic minerals or deposits with positive, after-tax PNV at four percent or a positive pre-tax PNV at zero percent DCFROR.

Nearly all of the mapped mineral activity tracts contain one or more deposits. For example, the Juneau Gold Belt contains the Alaska Juneau mine with a PNV of 373,811,000 dollars at four percent DCFROR, the Kensington and Jualin deposits with positive pre-tax PNV at zero percent DCFROR, and 26 other deposits which did not show positive PNV. Nevertheless, the entire Juneau Gold Belt tract has a ranking of 1 due to the emphasis given areas likely to have high exploration and development activity in the next 10 to 15 years.

All mineral activity tracts ranked priority 1, 2 or 3 will reflect a higher demand for mineral resources than areas outside the mineral tracts. Those deposits evaluated to have a positive PNV, and the activity tract that deposits are located in, could anticipate higher levels of mining-related activities than deposits currently with a negative PNV. Those deposits with a positive PNV at zero percent DCFROR are displayed in Table 3-42.

Table 3-42

Tongass mineral deposits with a positive net present value at zero percent discounted cashflow rate of return

Deposit Name	Dollars (1988)
Bohemia Basin	$ 202,000,000
Kensington	287,000,000
Johnson	41,000,000
Jualin	55,000,000
Herbert	5,000,000
Greens Creek	1,398,000,000
Chichagof & Hirst	155,000,000
Chichagof Tailings	12,000,000
Mt. Andrews	13,000,000
Union Bay	7,077,000,000
Goldstream	640,000
Quartz Hill	6,453,000,000
Bokan	719,000,000
Total	**$16,417,000,000**

Source: Coldwell, 1990.

Table 3-43 displays the acres of the mineral activity tracts by rank.

Table 3-43
Acres of identified mineral activity tracts on the Tongass National Forest

Rank	Acres	Percent of Total Forest Acres
Priority 1	392,443	2.3
Priority 2	32,968	0.2
Priority 3	179,578	1.1
Total	**604,989**	**3.6**

Figure 3-16 displays the location of all identified mineral activity tracts with high development potential on the Tongass National Forest. Table 3-44 displays the identified mineral resources of the Tongass National Forest by mineral activity tract.

Table 3-44

Identified mineral resources of the Tongass NF displayed by mineral activity tract

Map No.	Tract Name	Acres	Rank	Gross Value	Net Present Value	Gold (to)	Silver (to)	Lead (lbs)
1	Chilkat Peninsula	40	3	10.954	-	24,000	-	-
2	Sullivan[1]	7,938	1	-	-	-	-	-
3	Bohemia Basin[1]	9,376	1	530.320	202.032	-	-	-
4	Berners Bay	10,318	1	918.086	382.810	2,011,450	-	-
5	Juneau Gold Belt[1]	85,699	1	387.947	5.195	5,519,693	4,794,500	201,840,000
6	Fremming	501	3	5.859	-	7,500	30,000	300,000
7	Douglas Island	1,319	2	163.311	-	357,800	-	-
8	Funter Bay[1]	11,499	1	25.721	-	-	-	-
9	Greens Creek[1]	7,528	1	1,683.141	1,398.284	630,000	84,000,000	273,000,000
10	Taku Mo	3,199	3	11.440	-	-	-	-
11	Enterprise	1,505	3	4.793	-	10,500	-	-
12	Apex-El Nido	4,603	2	11.655	-	25,536	-	-
13	Basaltic Cu[1]	4,484	3	2.502	-	-	-	-
14	Mirror Harbor[1]	2,242	2	21.233	-	-	-	-
15	Pinta Bay[1]	1,301	3	-	-	-	-	-
16	Chichagof[1]	12,946	1	329.155	167.448	716,000	203,000	-
17	Slocum Arm[1]	8,625	3	-	-	-	-	-
18	Silver Bay[1]	22,706	3	-	-	-	-	-
19	Pyrola[1]	3,261	2	106.854	-	-	5,715,000	16,510,000
20	Hasselborg[1]	1,860	3	-	-	-	-	-
21	Crystal/Friday	1,391	2	27.386	-	60,000	-	-
22	Windham Bay[1]	23,909	3	9.664	-	20,655	20,120	4,000
23	Sumdum[1]	41,419	3	487.093	-	6,678	8,129,140	224,800
24	Pt Astley[1]	2,004	3	35.009	-	58,800	89,000	2,400,000
25	Zarembo[1]	27,886	1	60.008	-	7,800	3,174,000	10,060,200
26	Portage Mountain[1]	1,280	3	5.678	-	10,040	55,200	-
27	Duncan[1]	2,393	3	.050	-	-	-	-
28	Grnd Hog/Glacier[1]	15,859	1	237.677	-	-	683,784	126,230,000
29	El Cap Pass	42,763	1	2.837	-	-	-	-
30	N. Bradfield Cn[1]	1,120	3	23.790	-	-	-	-
31	Hyder[1]	56,396	1	95.497	-	107,999	1,755,175	53,797,300
32	Franks Ridge[1]	5,866	3	-	-	-	-	-
33	Khayyam[1]	23,450	1	5.970	-	5,040	25,200	-
34	South Arm[1]	7,943	3	-	-	-	-	-
35	Niblack[1]	8,915	1	-	-	-	-	-
36	Dolomi[1]	8,634	1	-	-	-	-	-
37	Lime Point	900	3	2.123	-	-	-	-
38	Big Harbor[1]	3,535	3	-	-	-	-	-
39	Jumbo[1]	12,326	1	31.848	-	28,800	63,900	-
40	Hollis	17,148	1	-	-	-	-	-
41	Kasaan*1	8,176	1	97.289	13.311	43,200	95,850	-
42	Salt Chuck[1]	4,817	1	2.757	-	1,189	19,635	-
43	Union Bay	17,492	3	12,511.500	7,077.019	-	-	-
44	Helm Bay	7,204	1	49.203	-	107,800	-	-
45	Tongass Narrows	4,488	1	85.451	637	189,240	-	-
46	Thorne Arm	7,657	1	51.668	-	113,200	-	-
47	George Inlet[1]	6,198	3	45.308	-	78,144	-	312,000
48	Quartz Hill	2,402	2	14,400.000	6,452.655	16,344,000	2,000,000	-
49	Barrier Island[1]	4,414	3	-	-	-	-	-
50	Nichols Mountain[1]	16,882	3	-	-	-	-	-
51	Bokan[1]	17,750	2	4,157.915	719.244	-	-	-
52	McLeod Bay	2,287	1	-	-	-	-	-

[1] Contains deposits of critical minerals.

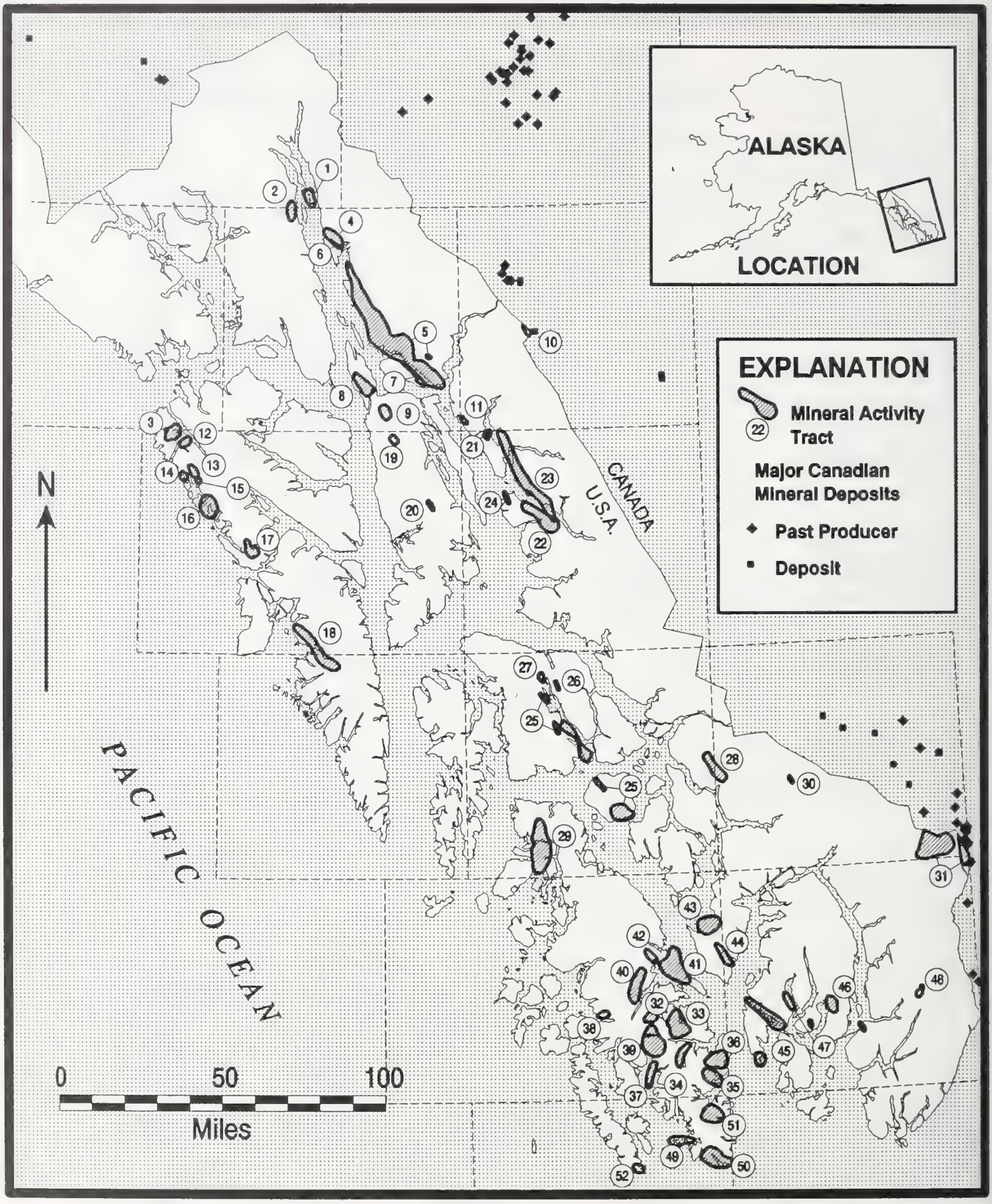
Table 3-44 (continued)

Map No.	Zinc (lbs)	Copper (lbs)	Moly (lbs)	Iron (tons)	Other Minerals
1	-	-	-	-	-
2	-	-	-	-	-
3	-	82,000,000	-	-	140,800,000 lbs Nickel; 8,000,000 lbs Cobalt
4	-	-	-	-	-
5	201,493,200	164,000	-	-	-
6	4,200,000	-	-	-	-
7	-	-	-	-	-
8	-	3,920,000	-	-	3,810,000 lbs Nickel; 1,680,000 lbs Cobalt
9	679,000,000	-	-	-	-
10	-	-	2,000,000	-	-
11	-	-	-	-	-
12	-	-	-	-	-
13	-	2,719,900	-	-	-
14	-	2,529,600	-	-	6,633,600 lbs Nickel
15	-	-	-	-	-
16	-	-	-	-	-
17	-	-	-	-	-
18	-	-	-	-	-
19	55,600,000	-	-	-	212,000 tons Barite
20	-	-	-	-	-
21	-	-	-	-	1,350 oz Platinum
22	4,000	-	-	-	-
23	37,002,000	313,975,000	-	-	-
24	11,786,000	758,000	-	-	-
25	31,548,000	1,133,000	-	-	-
26	-	-	-	-	-
27	-	54,000	-	-	-
28	404,230,000	286,000	-	-	-
29	-	-	496,000	-	-
30	-	3,420,000	-	313,500	-
31	4,673,920	1,919,200	150,000	-	420,000 lbs Tungsten
32	-	-	-	-	-
33	1,562,400	2,872,800	-	-	-
34	-	-	-	-	-
35	-	-	-	-	-
36	-	-	-	-	-
37	-	-	-	-	54,424 tons Barite
38	-	-	-	-	-
39	-	4,500,000	-	293,800	-
40	-	-	-	-	-
41	-	22,987,320	-	2,437,700	-
42	-	2,140,700	-	-	122 oz Palladium
43	-	-	-	190,000,000	-
44	-	-	-	-	-
45	-	-	-	-	-
46	-	-	-	-	-
47	-	-	-	-	-
48	-	-	2,517,396,000	-	-
49	-	-	-	-	-
50	-	-	-	-	-
51	-	-	-	-	11,729,000 lbs Uranium
52	-	-	-	-	-

Source: Coldwell, 1990

Figure 3-16

Identified mineral activity tracts with high development potential, Tongass National Forest



Leasable Minerals

Federally-owned leasable minerals include oil, gas, coal, geothermal resources, potassium, sodium, phosphates and sulfur. These minerals are subject to exploration and development under leases, permits, or licenses under the Mineral Leasing Act of 1920, as amended, the Mineral Leasing Act for Acquired Lands of 1947, the Geothermal Steam Act of 1970, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987. The authority to manage these minerals is presently administered by the U.S. Department of Interior, Bureau of Land Management in cooperation with the Forest Service.

On National Forest System lands open to leasing, the Bureau of Land Management requests Forest Service concurrence in their leasing process. The Forest Service recommends environmental stipulations to protect surface resources; these stipulations are then attached to the lease. Environmental protection measures and stipulations are developed based on environmental analysis (as documented in an environmental assessment or environmental impact statement), and on the management objectives adopted for the land upon which an application has been received.

Leasable supply. The resource potential for oil and gas is considered to be moderate to low in the Yakutat region. Coal occurrences are classified as lignite and of small extent. Geothermal resources occur in 19 known locations in Southeast Alaska. Potassium, sodium, phosphates, and sulfur do not occur on the Tongass National Forest.

Leasable demand. Presently, there are no leasable mineral applications or pending applications, prospecting permits, or geophysical exploration permits on the Forest. No leasable mineral commodities are presently being produced on the Tongass National Forest. The anticipated demand for leasable minerals on the Forest is expected to remain quite low.

Salable Minerals

Salable, or "common variety," minerals are defined by the Materials Act of 1947 and Public Law 167 of 1955. These minerals are sold rather than located or leased. In general, they occur widely and have a low unit value. Salable minerals include petrified wood and common varieties of sand, rock, building stone, gravel, pumice, clay, and other similar materials. Such common variety mineral materials include deposits which, although they have economic value, are used for agriculture supply and animal husbandry, building materials, cleaning and abrasive materials, construction, decorative and ornamental arts, and landscaping. Their sale is at the discretion of the Forest Service and regulated by 36 CFR 228.

The predominant salable commodity extracted on the Tongass National Forest is crushed rock used to construct timber sale roads.

Salable supply. The supply of quality rock sources is highly dependent upon the locations of active logging operations, because road construction to support timber production constitutes the predominant demand for "common variety" mineral material on the Tongass National Forest.

Presently, there is an adequate supply of rock sources with suitable quality (hardness and durability) on the Ketchikan Area. But, rock quality is poor on the Chatham and Stikine Areas and good material sources are difficult to locate in current timber production areas. Sand and gravel sources are scarce throughout the Forest except on the Yakutat Ranger District.

Salable demand. The dominant market for "common variety" mineral materials from public lands is crushed rock in support of the Tongass National Forest transportation program. The current construction yardage demands for arterial, collector, and local roads are expected to continue. The demand for rock will closely follow the need to construct new timber sale roads.

All roads built on the Tongass National Forest require rock for construction because the subgrade soils have poor strength characteristics. Of the total existing timber sale roads constructed on the Tongass National Forest, approximately 11.9 percent of the miles constructed were arterial roads, 31.9 percent collectors, and 56.2 percent local, averaging respectively, 15,000 cubic yards per mile, 13,500 cubic yards per mile, and 12,500 cubic yards of rock per mile to construct. The total in-service use of rock for these existing roads was 43,962,500 cubic yards, used to construct 3,355 miles of road (Arterial = 399 miles, Collector = 1,071 miles, and Local = 1,885 miles). This figure does not include reconstruction, temporary roads, log transfer facilities and log sort yards. The rock quantities indicated below in Table 3-45 depict the estimated total cubic yards of rock used to construct existing timber sale roads on the three administrative areas of the Tongass National Forest.

Table 3-45

Cubic yards of rock used to construct existing roads on the Tongass National Forest

Area	Arterial	Collector	Local	Total
Chatham	1,230,000	4,441,500	2,925,000	8,596,500
Stikine	720,000	4,158,000	4,450,000	9,328,000
Ketchikan	4,005,000	5,845,500	16,187,500	26,038,000
Total	**5,955,000**	**14,445,000**	**23,562,500**	**43,962,500**

Source: USDA Forest Service records

There are 116 existing log transfer facilities (LTF's) on the Forest. At approximately 12,000 cubic yards of rock of construction volume per LTF, they would amount to an additional rock volume of 1,392,000 cubic yards.

As the use of forest roads increases, and both the Alaska State Department of Transportation, and the Federal Highways Department, assume responsibility for road maintenance, the demand for crushed rock will increase. It will be expensive to locate sites with suitable quality and quantity in the northern part of the Forest, and haul distances will increase. As land exchanges continue, new communities and existing communities will require mineral materials for development of roads, and for foundations for homes, schools and other buildings. The demand for rock from public land in support of these growing communities will also increase.

The rock quantities indicated below in Table 3-46 depict the average volumes of rock utilized annually over the last decade for road construction on the Tongass National Forest.

Table 3-46

Cubic yards of rock used for road construction (13,500 CY/mi), FY 1981 - 1990

Fiscal Year	Construction Miles	Total Volume
1981	129.1	1,742,850
1982	219.3	2,960,550
1983	104.4	1,409,400
1984	73.7	994,950
1985	59.7	805,950
1986	111.9	1,510,650
1987	74.5	1,005,750
1988	103.5	1,397,250
1989	105.7	1,426,950
1990	85.1	1,148,850
Total	**1,066.9**	**14,403,150**

Source: USDA Forest Service records

Methodology and Scientific Accuracy

Seven methodologies are used for minerals inventories and the minerals analysis. These have been discussed briefly in the text already. A detailed discussion of each is included in Appendix J.

Minerals

Environmental Consequences

The availability of mineral resources of the Tongass National Forest will be affected by the implementation of Forest-wide standards and guidelines and the allocation of land use designations in each alternative. Under any alternative, future exploration and development would be precluded in areas recommended for withdrawal, and the standards and guidelines of certain land use designations could affect the cost of conducting exploration, development, and reclamation activities. The restrictions inherent in some land use designations could also influence interest in exploring some areas for their mineral resources. Mineral resources, including critical and strategic minerals, that are withdrawn or otherwise restricted will be lost, or become less available for use by society.

Demand for access to National Forest lands for the purpose of mineral exploration and development is expected to increase over the next ten years. Plans of Operation will continue to be submitted for approval, and regulations under which those operating plans are processed will not change by alternative. Identified and undiscovered mineral resource tracts, characteristics and location of mineral deposits, and Southeast Alaska geology will not vary as a result of implementing any of the alternatives.

The effects of alternatives on mineral resources can be determined by analyzing the relative degree to which land use designations and associated management prescriptions economically constrain proposed mineral activities, limit the availability of lands for mineral exploration and development, and reduce the amount of inventoried undiscovered and identified mineral resources available to the public. The land use designations have been grouped with respect to their potential effect on access and economic availability of mineral resources. These groups are discussed in this section and displayed in Table 3-47.

Withdrawn - High Operating Costs

The land use designations requiring withdrawal from mineral entry are Wilderness, Wilderness National Monument, Non-Wilderness National Monument, Research Natural Areas, Enacted Municipal Watersheds, and Wild Rivers. All of these land use designations preclude future mineral entry except for claims, leases, or permits with valid existing rights established prior to the date of withdrawal.

If valid existing rights are established, the Forest Service will facilitate mineral development and apply special stipulations and mitigation measures to protect and maintain the surface resources for which the management area was established as much as is reasonable and practicable. If valid existing rights are not established, the inventoried quantity, and value, of undiscovered and identified mineral resources are lost to society.

Table 3-47

Land use designations grouped with respect to their effect on access and economic availability of mineral resources

Mineral Access Group	Map Symbol	Land Use Designation
Withdrawn	WW	Wilderness
High Operating Costs.	WM	Wilderness Monument
Valid existing rights will be	NM	Non-Wilderness Monument
determined and recognized.	RA	Research Natural Areas
	MW	Enacted Municipal Watersheds
	WR	Wild Rivers
Open	PR	Primitive Recreation
High Operating Costs.	SP	Semi-Primitive Recreation
Special stipulations and	BF	Beach Fringe and Estuary
mitigation measures will be	OG	Old-Growth Habitat
applied. Some areas may be	EF	Experimental Forests
recommended for withdrawal to	SA	Special Interest Areas
protect surface resources.	SL	Stream and Lake Protection
	SR	Scenic Rivers
	LUD	Land Use Designation II
	WQ	Fish Habitat and Water Quality Requirements
	TUS	Transportation and Utility Systems
Open	ML	Modified Landscape
Average Operating Costs	SV	Scenic Viewshed
	RR	Recreation Rivers
	OA	Other Areas
	TM	Timber Production
	MM	Minerals Management

Open - High Operating Costs

Eleven of the 23 land use designations are in this group (Table 3-47). Experimental Forests, Special Interest Areas, and Transportation and Utility Systems could result in a recommendation for withdrawal of localized areas where surface resources for which the area was established are vulnerable and cannot be protected by measures other than withdrawal.

All of these land use designations are open to future mineral exploration and development and the Forest Service encourages the orderly development of mineral resources on these lands. However, special stipulations and mitigation measures will be applied in an approved Plan of Operation to protect and maintain the surface resources for which the management area was established as much as is reasonable and practicable.

As a consequence, exploration, development, and reclamation costs will be higher within these land use designations than in areas managed for resources that are less sensitive to mineral activities. Therefore, Forest Service surface management prescription standards and guidelines may influence the decision, or interest, of a prospector or mining company in exploring in these areas. Management prescriptions with higher operating costs may economically constrain availability of mineral resources, however, they do not preclude exploration or development should demand justify the higher cost of operating in these areas.

Open - Average Operating Costs

Land use designations considered to have average operating costs have forest management strategies generally compatible with mineral activities. Six of the 23 land use designations are in this group (Table 3-47).

All of these land use designations are open to future mineral exploration and development and the Forest Service encourages the orderly development of mineral resources on these lands. Mineral activities will not be restricted beyond reasonable precautions to protect the environment and to insure that management objectives for the affected lands are met as much as is reasonable and practicable.

Direct, Indirect, and Cumulative Effects

As previously described, minerals are classified into three categories: locatable minerals, leasable minerals, and salable minerals. By law, the Forest Service manages mineral resource programs that are specific to each mineral category. The consequences of implementing each alternative are discussed by mineral category.

Locatable Minerals

Locatable minerals are divided into identified resources and undiscovered resources. Only the identified mineral resource tracts were considered for allocation to the Minerals Land Use Designation (LUD). Should a substantial discovery occur, outside the presently identified mineral resource tracts, and be rapidly developed within the scope of this plan, a plan amendment would be required if inclusion of such a project in the Minerals LUD was desired. The vehicle for such an amendment would likely be the site-specific NEPA document, which would be completed prior to development of the mine.

Marine tailings disposal has been examined as a part of several mine development proposals in recent years. The technical, environmental, political, and legal implications and relative merits of this alternative to uplands tailings disposal have been studies. The fjord-estuarine systems of Southeast Alaska, which are not found in any other waters of the United States, appear to have characteristics which suit them as inert and stable repositories for mine tailings disposal. At this time, however, the Environmental Protection Agency, by internal legal determination, has concluded that such disposal cannot be permitted under the New Source Performance Standards (NSPS) provisions of the Clean Water Act. Marine tailings disposal is a site-specific, project-level consideration for the environmental analysis for any mine development, and as such is beyond the scope of this programmatic plan. Consideration of marine tailings disposal is not precluded under any of the alternatives.

Of the 52 identified mineral resource tracts, those listed in Table 3-48 below were considered for allocation of the minerals land use designation based on the themes of each alternative and commentary received after public review of the 1990 Draft Environmental Impact Statement (DEIS).

Table 3-48

Identified mineral resource tracts considered for allocation in each alternative.

Alternative	Tract No.	Tract Name	Acres
A Total Acres			**0**
B	3	Bohemia Basin	9,376
B	4	Berners Bay	10,318
B	5	Juneau Gold Belt	85,699
B	41	Kasaan	8,176
B	43	Union Bay	17,492
B	45	Tongass Narrows	4,488
B	51	Bokan	17,750
B Total Acres			**153,299**
C Total Acres			**0**
D	2	Sullivan	7,938
D	3	Bohemia Basin	9,376
D	4	Berners Bay	10,318
D	5	Juneau Gold Belt	85,699
D	8	Funter Bay	11,499
D	9	Greens Creek	7,528
D	25	Zarembo	27,886
D	28	Ground Hog/Glacier	15,859
D	29	El Cap Pass	42,763
D	33	Khayyam	23,450
D	35	Niblack	8,915
D	36	Dolomi	8,634
D	39	Jumbo	12,326
D	40	Hollis	17,148
D	41	Kasaan	8,176
D	42	Salt Chuck	4,817
D	43	Union Bay	17,492
D	44	Helm Bay	7,204
D	45	Tongass Narrows	4,488
D	46	Thorne Arm	7,657
D	51	Bokan	17,750
D	52	McLeod Bay	2,287
D Total Acres			**59,210**
P	2	Sullivan	7,938
P	3	Bohemia Basin	9,376
P	4	Berners Bay	10,318
P	5	Juneau Gold Belt	85,699
P	8	Funter Bay	11,499
P	9	Greens Creek	7,528
P	28	Ground Hog/Glacier	15,859
P	35	Niblack	8,915
P	36	Dolomi	8,634
P	41	Kasaan	8,176
P	43	Union Bay	17,492
P	51	Bokan	17,750
P Total Acres			**209,184**

In Alternative A the Minerals Land Use Designation (LUD) was not considered for allocation. This is due to the alternative's theme of emphasizing non-market values. The development of mineral resources in Alternative A would continue to be facilitated in land use designations open to mineral entry, but would not be emphasized by allocation.

In Alternative B the theme is to emphasize resource uses that contribute to the diversification of local and regional economies, while maintaining opportunities for local residents to pursue traditional lifestyles including subsistence use and recreation. In this alternative seven of the 10 identified mineral resource tracts with a positive present net value (PNV) at zero percent discounted cash flow rate of return (DCFROR) were allocated. The three not considered were those predominently in areas withdrawn from mineral entry: Greens Creek, Chichagof, and Quartz Hill. The cumulative acreage of these seven tracts totals to 153,299 acres.

In Alternative C the Minerals Management Land Use Designation (MM) was also not considered for allocation. This is due to the alternative's theme of maintaining the present management stance. The 1979 Forest Plan did not allocate to a minerals land use designation.

Alternative D is the most development-oriented of the five alternatives. Its theme is to provide an economic timber supply from public lands to facilitate the maintenance of existing mill capacity in Southeast Alaska. In concert with this theme, the allocation of mineral resources with high development potential is emphasized. Allocated in this alternative are the Rank 1 tracts, and those Rank 2 and 3 tracts with a positive PNV at zero percent DCFROR. The three exceptions are Chichagof and Quartz Hill, because they are in areas totally withdrawn from mineral entry, and Hyder, because commentary from local residents was adverse to allocation of the Minerals Land Use Designation in that area. The cumulative acreage of these 22 tracts totals to 359,210 acres.

Alternative P represents an attempt by the Forest Service to strike a balance of non-market and development uses, and contribute to the well-being of the local and regional economies of Southeast Alaska. Minerals development is emphasized in 12 selected areas deemed likely to provide positive economic return within the next 10-15 years. The cumulative acreage of these 12 tracts totals to 209,184 acres.

Identified Mineral Resources. The access and availability of identified mineral resources on the Tongass National Forest were analyzed for the years 1954 and 1988, and for Alternatives A-D and P. Figure 3-17 estimates the access and availability of mineral resources for 1954 and 1988, and displays the effects of alternative implementation on availability of identified mineral resources across the entire Tongass National Forest. Each pie chart represents 16,997,258 acres or 100 percent of the total acres on the forest. In 1954, before the original Tongass Land Management Plan (TLMP) and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), all lands on the Tongass National Forest were open to mineral entry with average operating costs. In 1988, after TLMP and ANILCA, but before passage of the Tongass Timber Reform Act of 1990 (TTRA), 33.3 percent of the forest was withdrawn from mineral entry, subject to valid existing rights, 25.1 percent of the lands open to mineral entry were in the open, with high operating costs, group, and 41.6 percent were in the open, with average operating costs, group. The current management direction, which incorporates TTRA, is depicted by the Alternative C pie chart in Figure 3-18, if the 0.2 percent recommended withdrawal slice (RW) is included in the open with high operating costs slice (OH) to total 34.7 percent. As depicted, 35 percent of the forest is withdrawn from mineral entry, subject to valid existing rights, and the percentage of lands open to entry with average operating costs has declined to 30.3 percent.

Alternative A and B, in part, embody themes that include non-market emphasis. They recommend additional withdrawals of 1.9 percent and 1.1 percent, respectively. They increase the amount of lands open to entry with high operating costs from the present 34.7 percent (Alternative C with RW slice added to OH slice) to 45.4 and 42.5 percent, respectively. This represents an increase of 10.7 percent for Alternative A, and 7.8 percent for Alternative B .

The theme of Alternative C is to continue the management direction of the 1979 TLMP, but Research Natural Areas (RNA's) amounting to about 0.2 percent (34,000 acres) are recommended for withdrawal. Operating cost percentages do not vary significantly in this alternative.

Alternatives D and P, which embrace more development oriented themes, affect the amount of lands open to entry with high operating costs very little, 0.5 percent and 1.2 percent, respectively. But, they do recommend withdrawals for RNA's and Wild River segments. The recommended withdrawals amount to 0.4 percent and 0.6 percent, respectively. These allocations would accrue at the expense of lands open to entry with average operating costs, which would decline by 0.9 percent and 1.8 percent, respectively.

Identified mineral resources have been inventoried and mapped for the Tongass National Forest by the U.S. Bureau of Mines in their report by Coldwell, 1990. There are 52 mineral activity tracts mapped with approximately 604,989 acres. The estimated, in-place, gross metal value of the identified mineral resources within the mineral activity tracts is 37.1 billion dollars (1988). Access and economic availability of the identified mineral resources within the inventoried mineral activity tracts were analyzed for each alternative. Figure 3-18 displays the effects of alternative implementation on all identified mineral activity tracts. Each pie chart represents 604,989 acres or 100 percent.

Figure 3-17

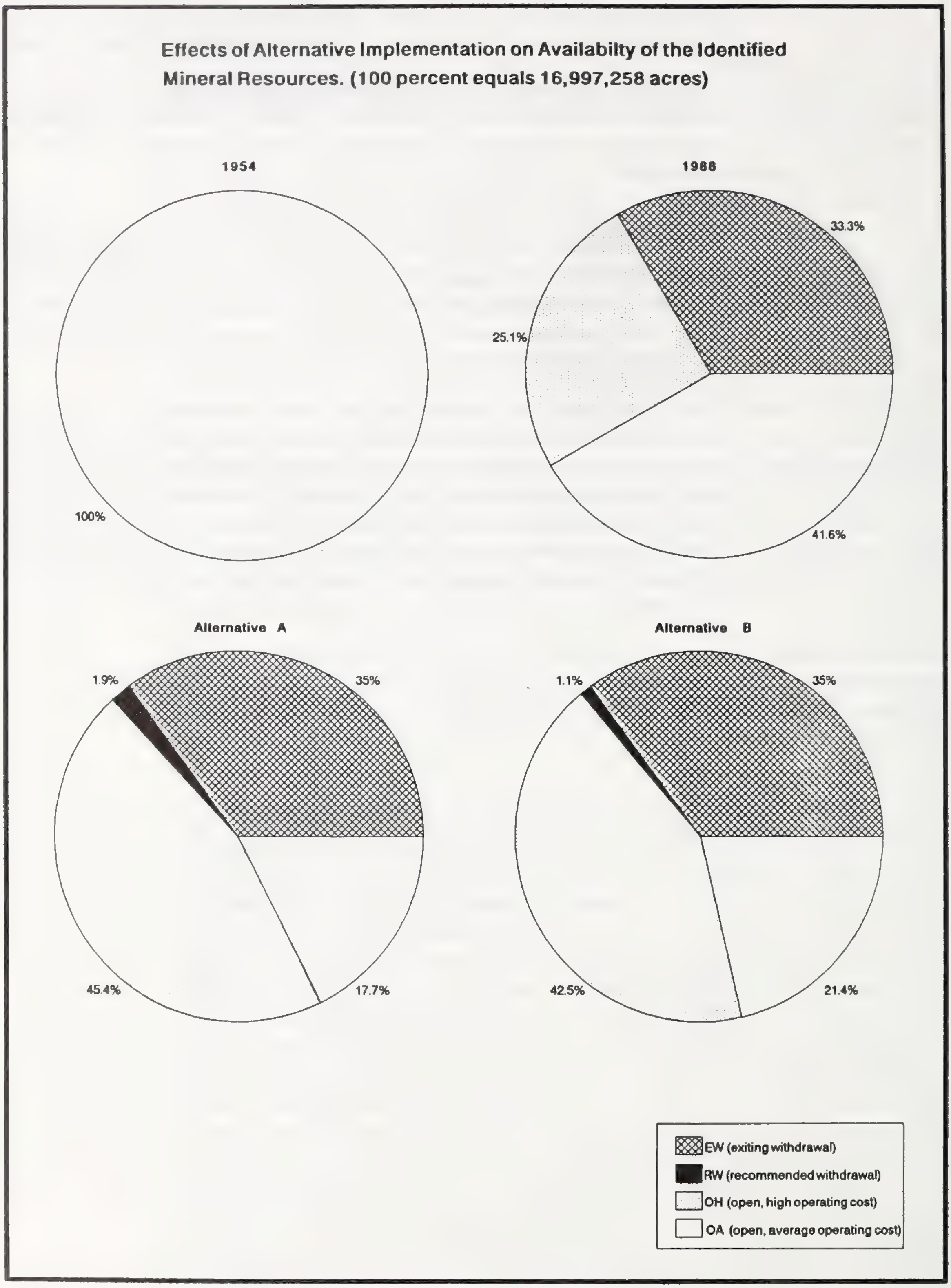

Effects of Alternative Implementation on Availabilty of the Identified Mineral Resources. (100 percent equals 16,997,258 acres)
1954
100%
1988
33.3%
25.1%
41.6%
Alternative A
1.9%
35%
45.4%
17.7%
Alternative B
1.1%
35%
42.5%
21.4%
EW (exiting withdrawal)
RW (recommended withdrawal)
OH (open, high operating cost)
OA (open, average operating cost)

Figure 3-17 (continued)

Effects of Alternative Implementation on Availabilty of the Identified Mineral Resources. (100 percent equals 16,997,258 acres)

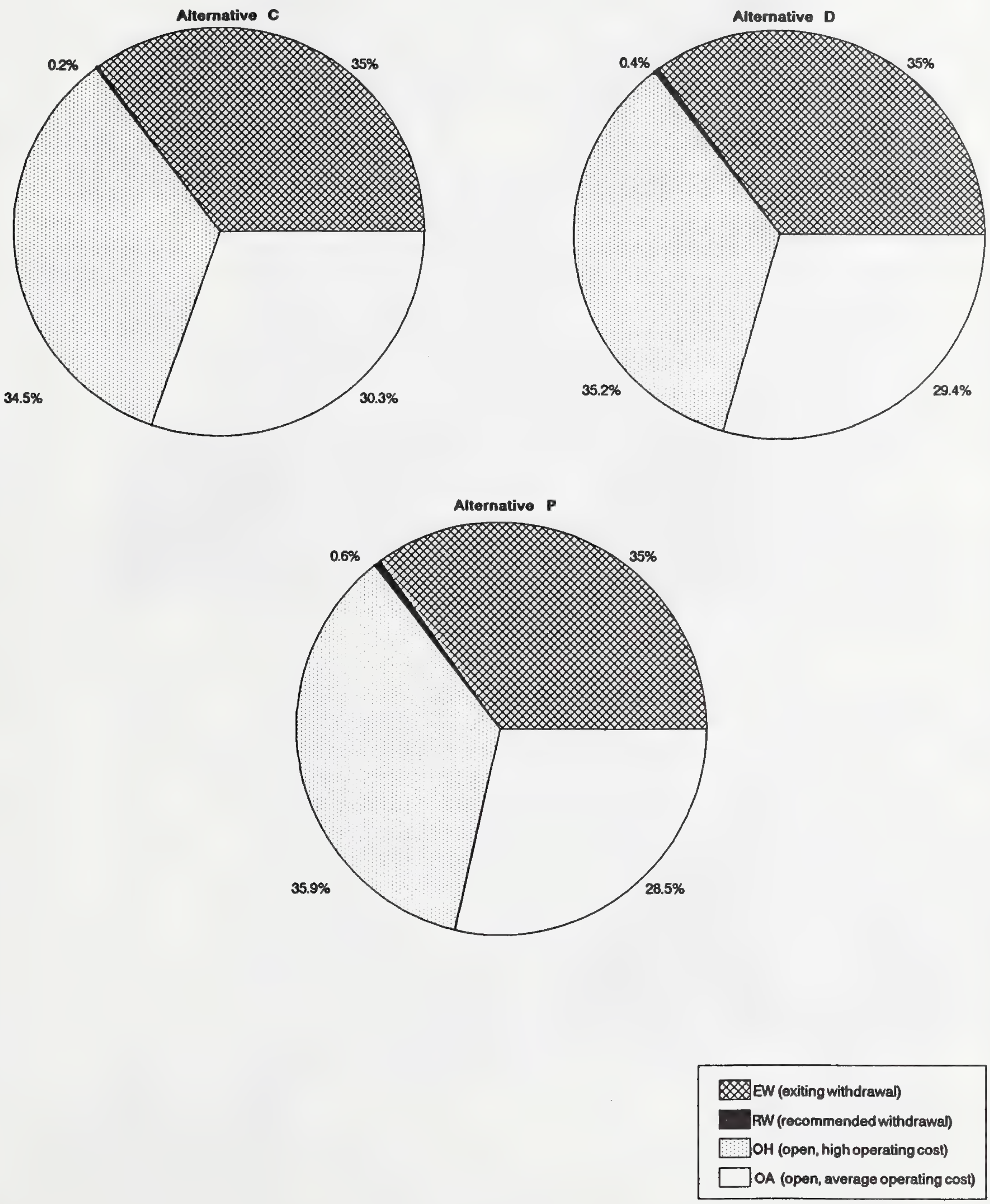
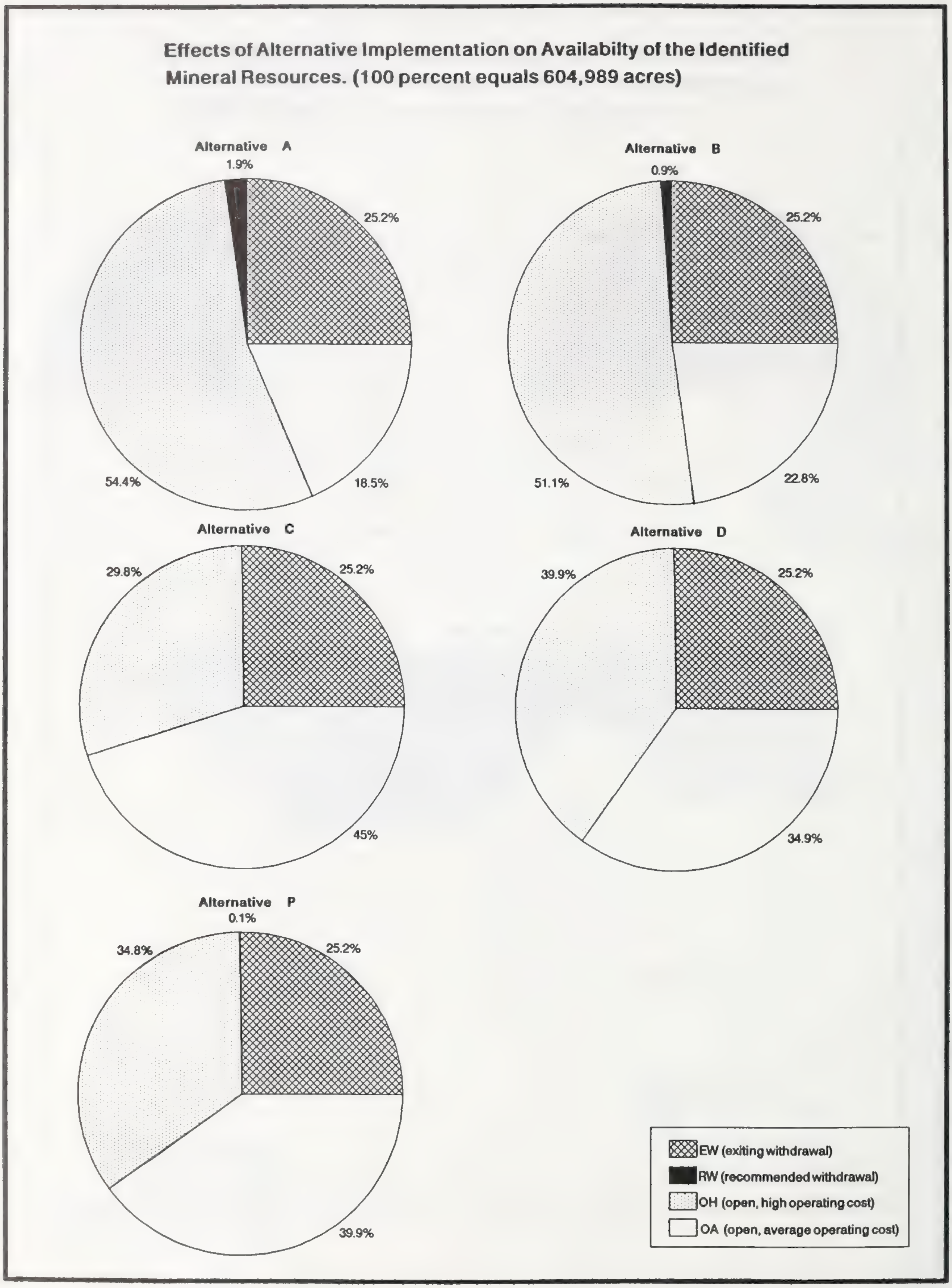


Figure 3-18


Effects of Alternative Implementation on Availabilty of the Identified Mineral Resources. (100 percent equals 604,989 acres)
Alternative A
1.9%
25.2%
18.5%
54.4%
Alternative B
0.9%
25.2%
22.8%
51.1%
Alternative C
29.8%
25.2%
45%
Alternative D
39.9%
25.2%
34.9%
Alternative P
0.1%
34.8%
25.2%
39.9%
EW (exiting withdrawal)
RW (recommended withdrawal)
OH (open, high operating cost)
OA (open, average operating cost)

In 1954 all mineral activity tracts were open to mineral entry with average operating costs. Consequently, $37.1 billion (1988 dollars) or 100 percent of the inventoried gross metal values of identified mineral resources on the Tongass National Forest were available to society. Assuming the total gross metal values are evenly distributed over the 604,989 acres of inventoried mineral activity tracts and that valid existing rights are not established in subsequently withdrawn lands, the following decline in availability is observed. In 1988, prior to enactment of TTRA, twenty percent of the inventoried mineral activity tracts were withdrawn by ANILCA from mineral entry. At that time this represented an estimated $7.4 billion (20 percent) of the forest's inventoried gross metal values.

Currently, 25.2 percent of the inventoried mineral activity tracts are withdrawn from future mineral exploration and development. Consequently, an estimated $9.5 billion of the inventoried gross metal values on the Tongass National Forest would no longer be available to society.

As depicted in Figure 3-18, Alternatives A and B would withdraw an additional 1.9 percent and 0.9 percent, respectively, of the mineral activity tracts from future mineral exploration and development. Consequently, an additional $705 to $334 million (1988 dollars) of inventoried gross metal values would be withdrawn. Alternative C, which depicts the current management direction, and Alternative D would withdraw no additional acreage from the inventoried mineral activity tracts. Alternative P would withdraw 0.1 percent, which amounts to about $37 million (1988 dollars) of the inventoried gross metal value. As indicated in Alternative C, 45 percent of the inventoried identified mineral activity tracts are currently open to entry under average operating costs. In the other four alternatives, this percentage decreases from 45 percent to 18.5 percent in Alternative A; to 22.8 percent in Alternative B; to 34.9 percent in Alternative D; and to 39.9 percent in Alternative P.

Appendix J displays the effects of alternative implementation for each of the 52 identified mineral activity tracts in the Tongass National Forest, including the various mineral activity tracts considered for allocation of the minerals land use designation in Alternatives B, D and P (Table 3-48). The total area depicted by each pie chart is that of each identified mineral activity tract.

Undiscovered Mineral Resources. The access and availability of undiscovered mineral resources were analyzed using the U.S. Geological Survey (USGS) report on the undiscovered locatable mineral endowment of the Tongass National Forest (Brew, 1990). It estimates that the total undiscovered locatable mineral resource endowment of the Forest, including those presently withdrawn from mineral entry, is $28.3 billion (1988) gross metal value. The estimate of gross metal value in 1988 after consideration of the withdrawals enacted by ANILCA is $24.4 billion (1988). And, the estimate of gross metal value in 1990 after consideration of the additional withdrawals enacted by TTRA is $23.5 dollars (1988). Thus, the report concludes that ANILCA removed from availability about $3.9 billion (1988) in undiscovered mineral resources, and TTRA withdrew an additional $900 million (1988), which brings the total to $4.8 billion (1988) in undiscovered locatable gross metal values lost to society through the withdrawal of public lands from mineral entry on the Tongass National Forest over the last decade. These lands are represented below in Figure 3-22 as the 33.8 percent EW slice (existing withdrawal) on all pie charts.

Figures 3-19, 3-20, and 3-21 depict the three administrative areas of the Tongass National Forest; the Chatham Area, Stikine Area, and Ketchikan Area, respectively. They indicate the generalized locations of individual undiscovered mineral resource tracts within the forest, based on the ratio of gross metal value of probabalistically determined undiscovered mineral resources in a given tract to the area of the tract in square kilometers and acres. These dollar/acre ratios are divided into the 4 classes indicated below in Table 3-49.

Table 3-49

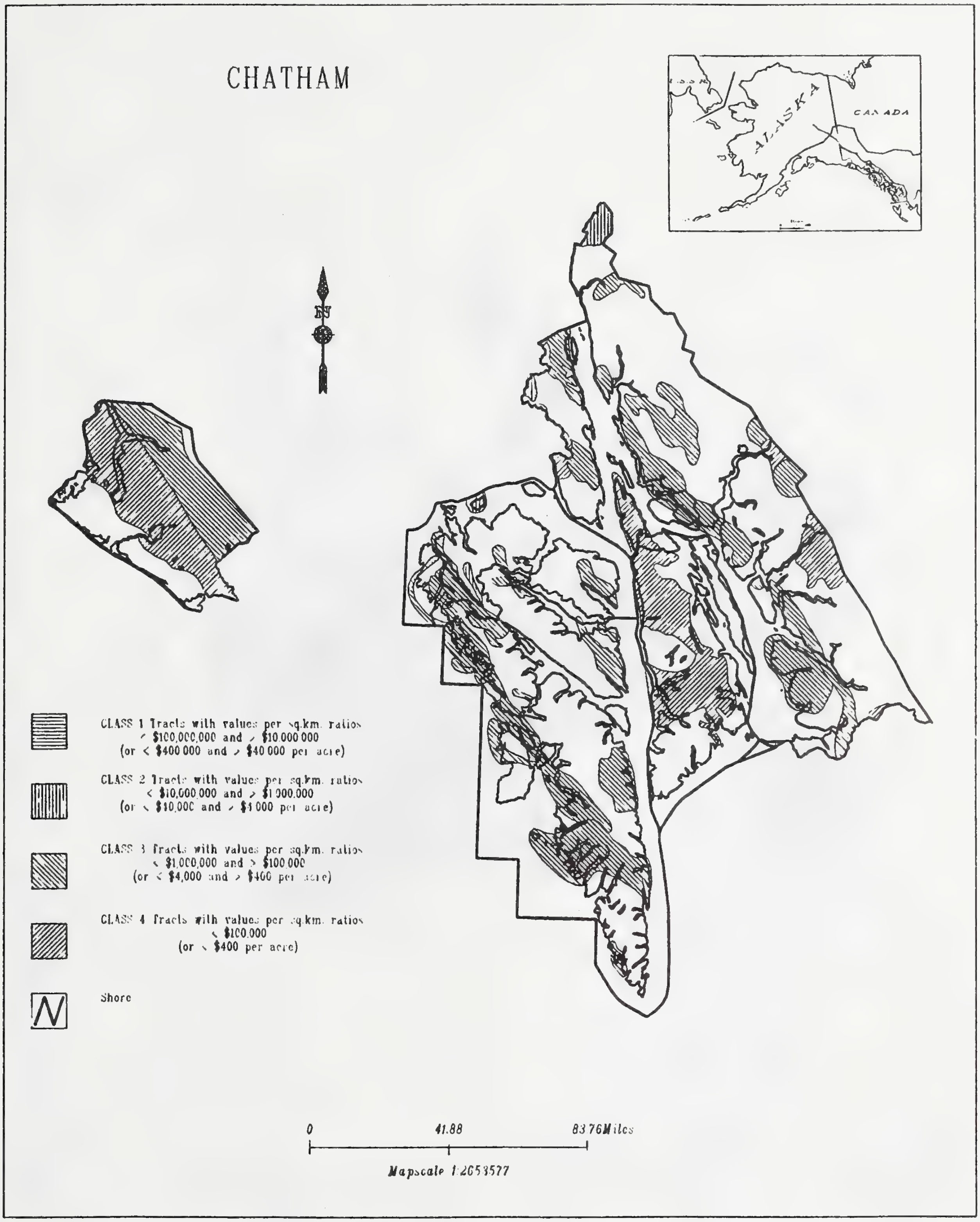
The four classes (dollar/acre ratios) of undiscovered mineral resources

Class	Dollar/Acre Ratios	Total Acres in Class(es)	% of Total Class Acres	% of Total Forest Acres
1	<$400,000 >$40,000	120,428	1.8	0.7
2	<$40,000 >$4,000	887,949	13.3	5.2
3	<$4,000 >$400	3,510,507	52.8	20.7
4	<$400	2,138,263	32.1	12.6
Totals		**6,657,147**	**100%**	**39.2**

Source: Brew, 1990.

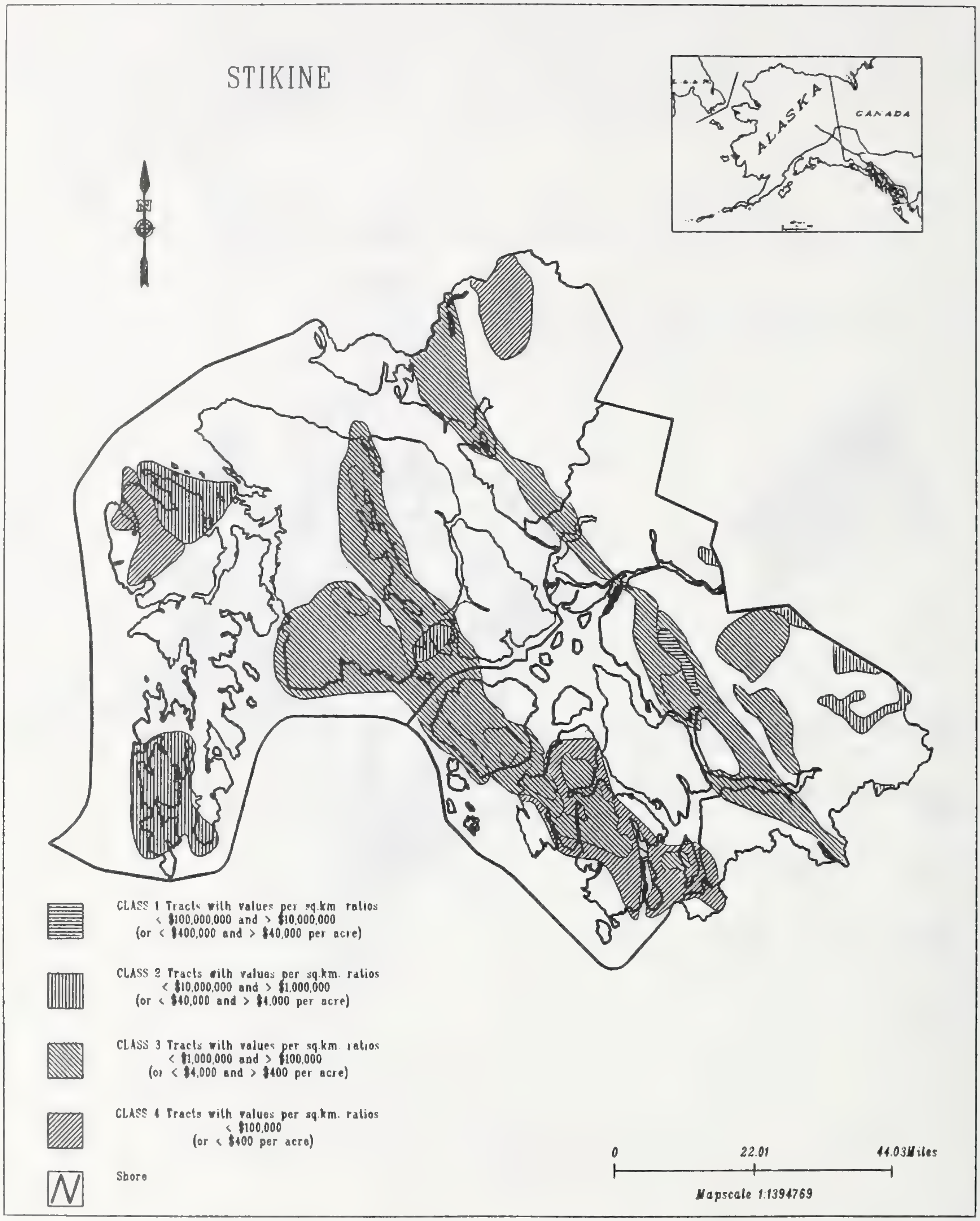
An estimate of the effects of alternative implementation on the access and availability of undiscovered mineral resources is presented in Figure 3-22.

Figure 3-19



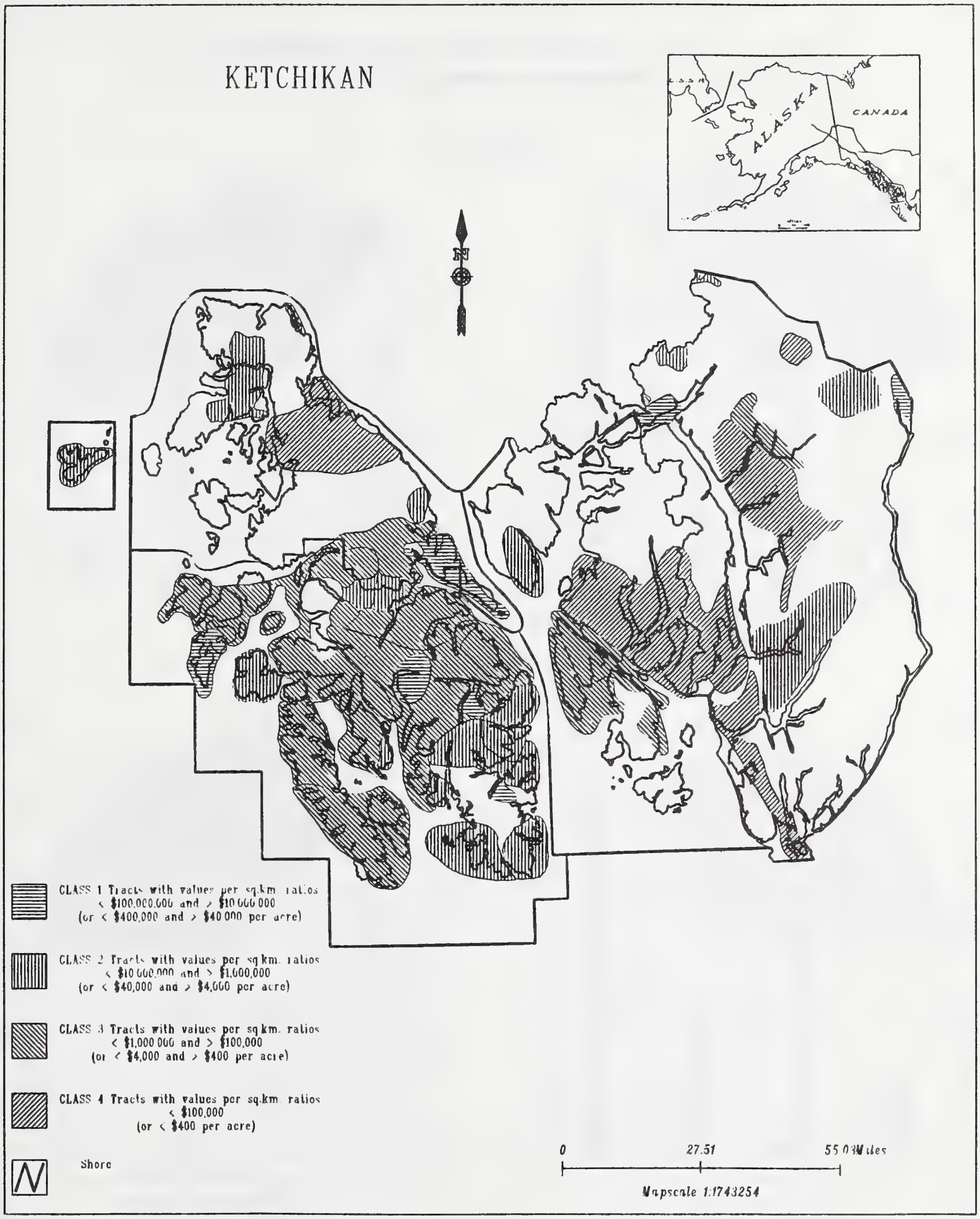
Undiscovered Mineral Resources Of The Tongass National Forest

Figure 3-20



Undiscovered Mineral Resources Of The Tongass National Forest

Figure 3-21



Undiscovered Mineral Resources Of The Tongass National Forest

Figure 3-22

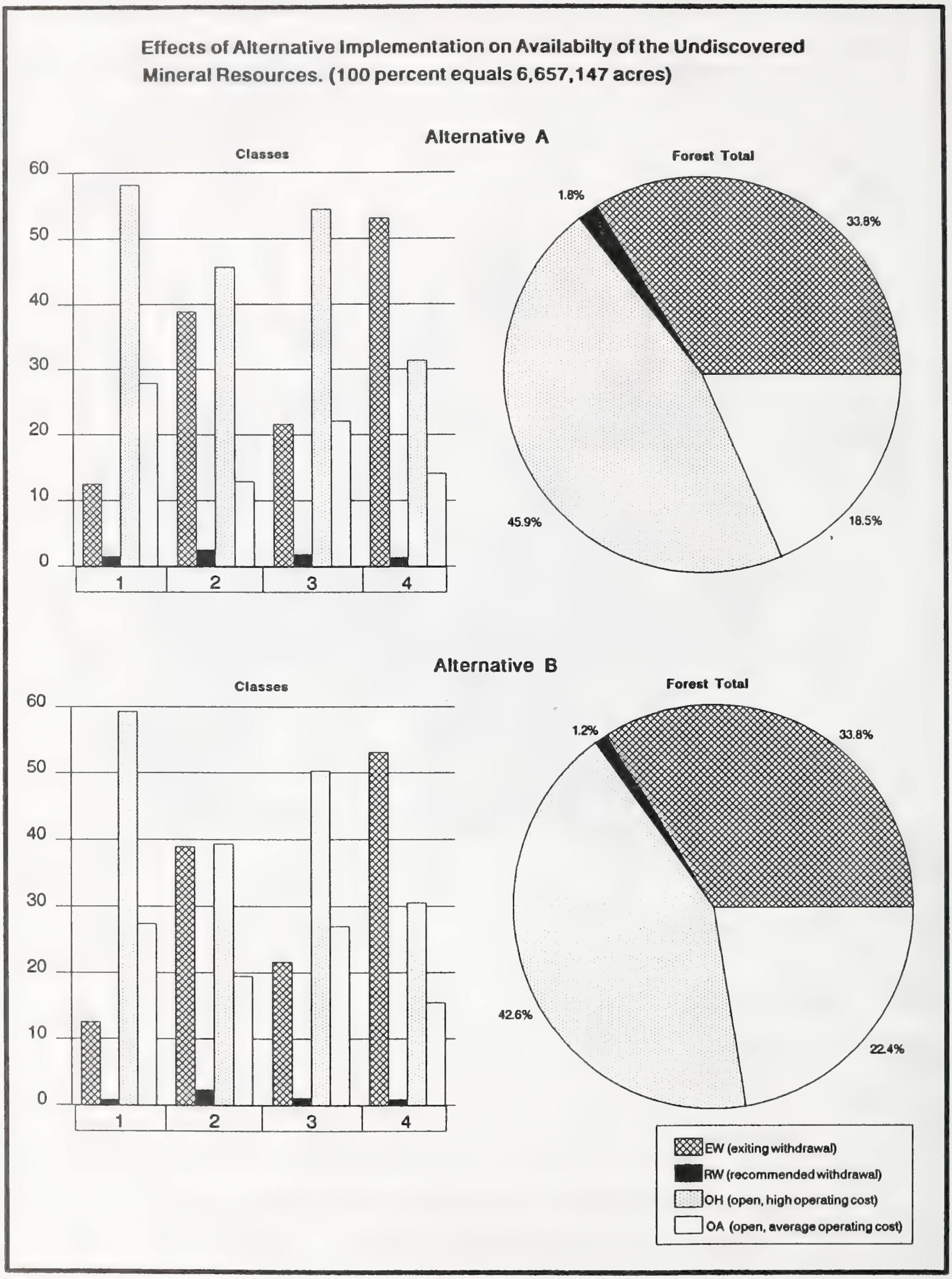

Effects of Alternative Implementation on Availabilty of the Undiscovered Mineral Resources. (100 percent equals 6,657,147 acres)
Alternative A
Classes
Forest Total
60
50
40
30
20
10
0
1
2
3
4
1.8%
33.8%
45.9%
18.5%
Alternative B
Classes
Forest Total
60
50
40
30
20
10
0
1
2
3
4
1.2%
33.8%
42.6%
22.4%
EW (exiting withdrawal)
RW (recommended withdrawal)
OH (open, high operating cost)
OA (open, average operating cost)

Figure 3-22 (continued)

Effects of Alternative Implementation on Availabilty of the Undiscovered Mineral Resources. (100 percent equals 6,657,147 acres)

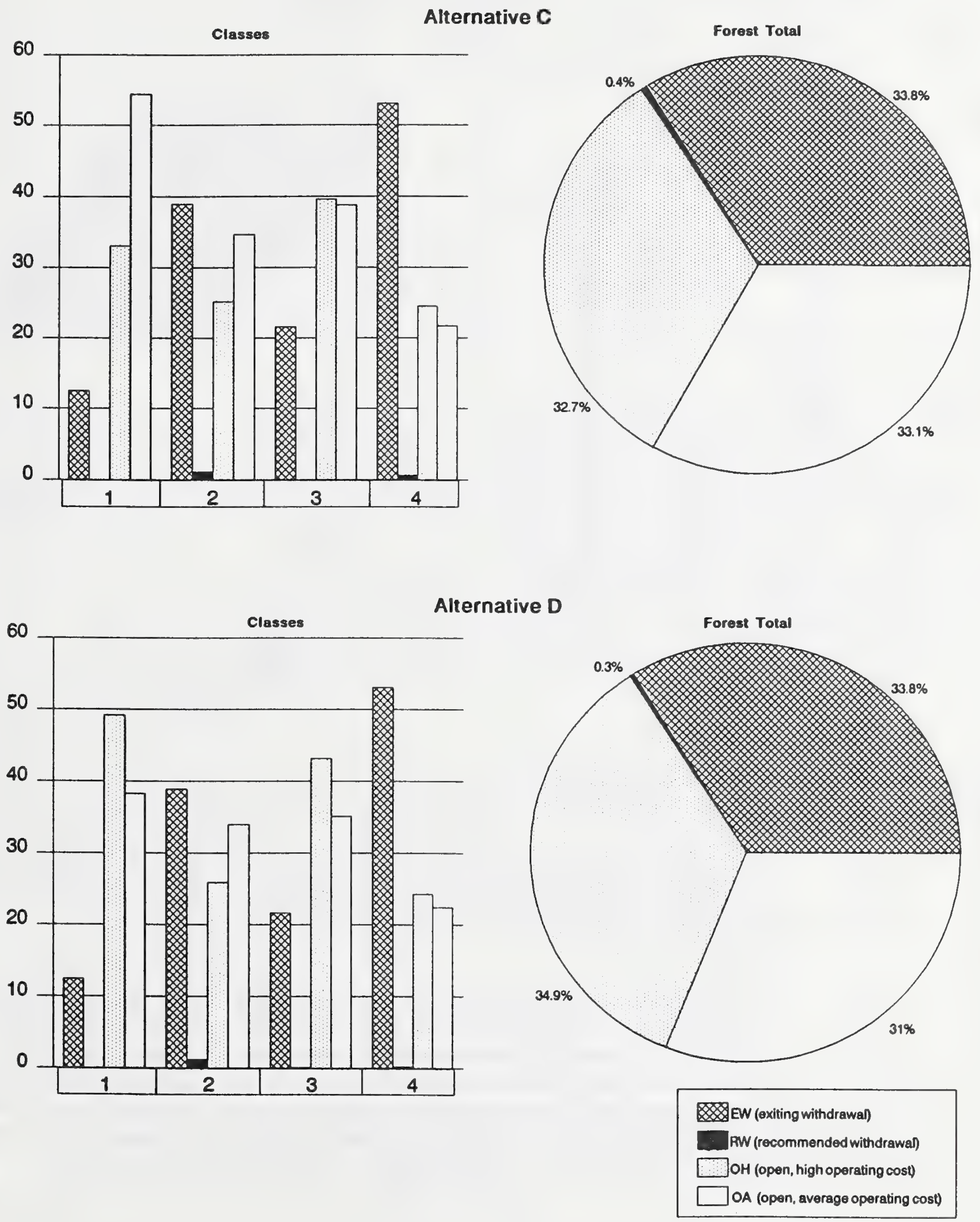
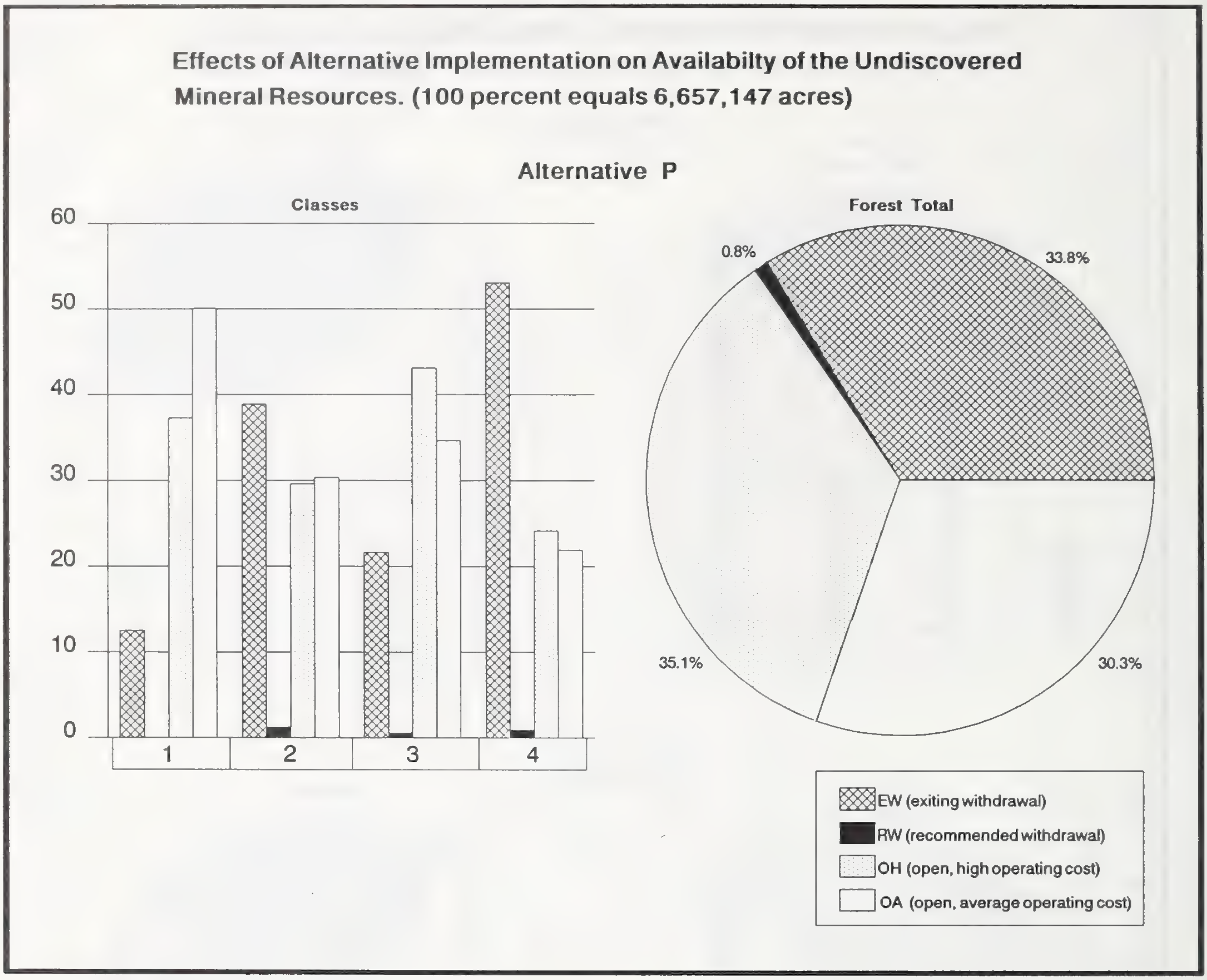


Figure 3-22 (continued)



Referring to Figure 3-22 above, Alternative C repesents the current management direction on the Forest, if the RW slice of the pie chart is added to the OH slice. At present, 33.8 percent of the lands embracing undiscovered mineral resource potential are withdrawn from mineral entry, 33.1 percent are open with high operating costs and 33.1 percent are open with average operating costs.

All five of the above alternatives propose additional withdrawals. The bar chart to the left of each alternative's pie chart, indicates which undiscovered mineral class(es) the withdrawals would affect. Additionally, if it is assumed that the gross metal value of the undiscovered mineral resources is distributed evenly in each class over the entire 6,657,147 acres of inventoried tracts, and a valuation is assigned to each class, then a dollar figure can be calculated to estimate the cost in undiscovered mineral resources lost to recommended withdrawals in each alternative. This information is displayed in Tables 3-50 and 3-51.

Table 3-50

Cost estimation of alternative implementation on the availability of undiscovered mineral resources (RW = recommended withdrawal)

Class	Valuation[1]	Alt. A RW acres $ millions	Alt. B RW acres $ millions	Alt. C RW acres $ millions	Alt. D RW acres $ millions	Alt. P RW acres $ millions
1	$180,000/acre	1,740.0 $313.2	961.0 $173.0	0.0 0.0	0.0 0.0	60.0 $10.8
2	$18,000/acre	21,922.0 $394.6	19,999.0 $360.0	10,640.0 $191.5	10,640.0 $191.5	10,840.0 $195.1
3	$1,800/acre	65,414.0 $117.7	38,939.0 $70.1	40.0 $0.01	2,799.0 $5	21,372.0 $38.5
4	$180/acre	29,815.0 $5.4	19,691.0 $3.5	14,451.0 $2.6	4,501.0 $0.8	19,585.0 $3.5
Total cost of RW's		**$830.9**	**$606.6**	**$194.1**	**$197.3**	**$247.9**

Source: Brew, 1990.

[1] In Classes 1, 2, and 3 the arithmetic mean of the value spread was selected to approximate recommended withdrawal costs. In class 4, $180 was selected to maintain a consistent decline in the order of magnitude from Class 1 to Class 4.

As indicated in Alternative C of Figure 3-22, 33.1 percent of the inventoried undiscovered mineral tracts are currently open to entry under average operating costs. In the other four alternatives, this percentage decreases from 33.1 percent to 18.5 percent in Alternative A; to 22.4 percent in Alternative B; to 30.3 percent in Alternative P; and to 31 percent in Alternative D.

Table 3-51

Combined allocation costs of lost identified and undiscovered mineral resources on the Tongass National Forest

	Alt A $ millions	Alt B $ millions	Alt C $ millions	Alt D $ millions	Alt P $ millions
Identified Mineral Resources	$705.0	$334.0	0.0	0.0	$37.0
Undiscovered Mineral Resources	$830.9	$606.6	$194.1	$197.3	$247.9
Combined Costs of Lost Mineral Resources	$1,535.9	$940.6	$194.1	$197.3	$284.9

Source: Coldwell, 1990; Brew, 1990

Leasable Minerals

The effects of alternative implementation on leasable minerals is not discussed. The Tongass National Forest does not have leasable mineral activity and leasable minerals were not identified as an issue in public scoping.

Salable Minerals

Salable or common variety minerals, primarily crushed rock, are utilized in each of the alternatives. Their predominent use is to construct roads in support of the Tongass National Forest transportation system. Most roads in the system are for timber production.

The rock volumes indicated below in Tables 3-52 and 3-53 project rock utilization on the forest for construction of timber sale roads and log transfer facilities (LTF's,) respectively. They assume 13,500 cubic yards (c.y.) per mile for road construction and 12,000 c.y. per LTF. These figures do not include minor rock volumes utilized for road reconstruction, temporary roads, and other construction uses.

LTF construction would be uniformly distributed over a 30-year period.

Table 3-52

Projected rock volume use for road construction per decade in millions of cubic yards (based on 13,500 c.y. per mile)

Administrative Area	Decades 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Alternative A																
Chatham	2.82	2.96	1.04	0.53	0.84	1.11	1.38	0.05	0.03	0.00	0.00	0.00	0.00	0	0	0
Stikine	6.72	6.09	2.13	1.77	1.20	2.25	2.28	0.28	0.04	0.00	0.00	0.00	0.00	0	0	0
Ketchikan	8.73	8.95	2.20	3.75	3.02	3.44	5.13	0.71	0.05	0.01	0.01	0.03	0.01	0	0	0
Total	**18.27**	**18.00**	**5.37**	**6.05**	**5.06**	**6.08**	**8.79**	**1.04**	**0.12**	**0.01**	**0.01**	**0.03**	**0.01**	**0**	**0**	**0**
Alternative B																
Chatham	3.81	3.96	1.36	0.74	1.05	1.47	1.80	0.27	0.05	0.01	0.00	0.00	0.00	0	0	0
Stikine	7.86	7.06	2.70	2.40	1.42	2.54	3.44	2.13	0.03	0.00	0.01	0.01	0.00	0	0	0
Ketchikan	9.61	9.88	2.71	4.04	3.46	3.51	5.68	1.35	0.05	0.00	0.00	0.00	0.00	0	0	0
Total	**21.28**	**20.90**	**6.77**	**7.18**	**5.93**	**7.52**	**10.92**	**3.75**	**0.13**	**0.01**	**0.01**	**0.01**	**0.00**	**0**	**0**	**0**
Alternative C																
Chatham	5.33	4.94	1.86	1.93	1.90	1.58	0.92	0.12	0.00	0.00	0.00	0.00	0.00	0	0	0
Stikine	9.34	8.76	3.17	3.02	1.73	3.19	3.86	3.38	0.07	0.00	0.01	0.03	0.00	0	0	0
Ketchikan	5.12	16.36	4.47	6.05	4.70	5.41	7.83	3.98	0.07	0.00	0.00	0.00	0.00	0	0	0
Total	**29.79**	**30.06**	**9.50**	**11.00**	**8.33**	**10.18**	**12.61**	**7.48**	**0.14**	**0.00**	**0.01**	**0.03**	**0.00**	**0**	**0**	**0**
Alternative D																
Chatham	5.16	5.59	1.88	1.32	1.46	1.90	2.42	0.62	0.09	0.07	0.00	0.00	0.00	0	0	0
Stikine	10.38	9.79	3.54	3.35	1.89	3.51	4.29	3.43	0.11	0.01	0.00	0.03	0.00	0	0	0
Ketchikan	14.63	15.70	4.19	5.63	4.01	5.41	7.72	3.86	0.08	0.00	0.00	0.00	0.00	0	0	0
Total	**30.17**	**31.08**	**9.61**	**10.30**	**7.36**	**10.82**	**14.43**	**7.91**	**0.28**	**0.08**	**0.00**	**0.03**	**0.00**	**0**	**0**	**0**
Alternative P																
Chatham	4.68	4.58	1.63	1.55	1.62	1.15	0.73	0.05	0.11	0.03	0.00	0.00	0.00	0	0	0
Stikine	8.71	7.98	2.98	2.81	1.51	3.00	3.67	2.88	0.05	0.00	0.01	0.03	0.00	0	0	0
Ketchikan	13.77	14.90	3.85	5.55	4.25	4.98	7.37	3.36	0.07	0.00	0.00	0.00	0.00	0	0	0
Total	**27.16**	**27.46**	**8.46**	**9.91**	**7.38**	**9.13**	**11.77**	**6.29**	**0.23**	**0.03**	**0.01**	**0.03**	**0.00**	**0**	**0**	**0**

Table 3-53

Projected rock volume utilization for log transfer facilities by alternative (Cubic Yards of Rock,12,000 c.y./LTF)

Administrative Areas	Alternatives A	B	C	D	P
Chatham	384,000	528,000	912,000	360,000	768,000
Stikine	324,000	324,000	384,000	360,000	348,000
Ketchikan	468,000	612,000	816,000	732,000	780,000
Forest Total	**1,176,000**	**1,464,000**	**2,112,000**	**1,716,000**	**1,896,000**

Old-Growth Forests

Affected Environment

Background

The Forest Service recognizes the many significant values associated with old-growth forests. Biological diversity, wildlife and fish habitat, recreation, visual quality, soil productivity, water quality and high-quality timber are valued components of old-growth forests. Balancing these important but conflicting values of old growth is an important and difficult planning problem.

Definition

Old-growth forests are ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function.

Old growth is typically distinguished from younger growth by several of the following attributes:

- Large trees for species and site.
- Wide variation in tree sizes and spacing.
- Higher accumulations of large-size dead standing and fallen trees compared to earlier stages.
- Decadence in the form of broken or deformed tops or bole and root decay.
- Multiple canopy layers.
- Canopy gaps and understory patchiness.

Rates of change in composition and structure of an old-growth forest are slow when compared to younger forests.

Sporadic, low- to moderate-severity disturbances are an integral part of the internal dynamics of old-growth forests. Canopy openings resulting from the death of overstory trees often give rise to patches of small trees, shrubs, and herbs in the understory.

The structure and function of an old-growth forest will be influenced by its stand sizes, landscape position, and context.

Changes Since the DEIS

Old-growth definitions have been changed by a Regional Interagency Old Growth Task Force to incorporate Forest cover types and plant associations. Table 3-54 displays the cover types and the general characteristics associated with each type.

The Forest is currently working on approaches to develop quantitative displays (maps and acres) for types. At the present time, quantitative displays of old growth are presented using the same resource information and techniques as described in the DEIS with the following modifications:

1. Data on existing and future volume class 7 old growth is displayed (previously volume class 7 was combined with volume class 6).
2. Old growth data is displayed by 21 ecological provinces.
3. Acres of old growth have been updated to account for timber harvesting which has occurred through 1990.

A discussion of the relationship of old-growth harvest and global warming has been added under "Research Needs".

Table 3-54

Old-growth forest cover plant association (P.A.) series, types, and general characteristics

Forest Types										
Forest Cover Type:	#223		#224		#227		#227 Variants		#205	#218
P.A. Series:	Sitka Spruce		Western Hemlock		W.Hem.-Red Cedar		W.Hemlock AK Cedar	Mixed Conifer	Mountain Hemlock	Shore Pine
P.A. Sub-Series:[1]	Alluv.	Other	Well Dr.	Poor Dr.	Well Dr.	Poor Dr.				
Minimum Stand Characteristics										
Main Canopy										
# Large Trees/Acre	6	7	21	17	16	15	28	12	12	18
# Large Decadent Trees/Acre	4	2	7	6	6	7	7	7	5	8
Min. DBH/Large Trees (inches)	27	23	19	15	21	19	15	11	13	9
Min Age/Large Trees	150	150	150	150	150	150	150	150	150	150
Canopy Layers & Structure										
# of Tree Canopy Layers	2	2	3	2	3	3	3	3	1	2
# of Diameter Classes	2	3	4	4	6	6	4	3	3	2
Snags										
# Standing Snags/Acre	2	1	2	3	5	3	3	4	2	2
# Decay Class Groups[2]	2	2	2	2	2	2	2	2	2	2
Min DBH (inches)	27	23	19	15	21	19	15	11	13	9
Min Height (feet)	10	10	10	10	10	10	10	10	10	10
Down Material										
# Pieces/Acre	2	4	6	6	6	6	8	4	4	2
# Decay Class Groups[3]	2	2	2	2	2	2	2	2	2	1
Min Dia/Largest Point (inches)	27	23	19	15	21	19	15	11	13	9
Min Length (feet)	10	10	10	10	10	10	10	10	10	10
Forbs										
Percent Cover (%)	5	5	5	5	5[4]	3	10	-	5	-

Source: Regional Interagency Old Growth Task Force, January 1991 draft version. Main canopy, canopy layers, and snag values derived from 1980's timber inventory data set; canopy layers and diameter classes must have at least 5 trees per acre; diameter classes are 2 inch increments. Down material and age values derived from old-growth task group professional judgement. Forb values derived from plant association data set.

[1] P.A. Sub-Series: Well Dr = Well Drained Soils; Alluv = Alluvial Soils; Poor Dr = Poorly Drained Soils;

Other = Coastal Salt Spray, Stikine Loess, and Over Steepened Uplands.

[2] Decay Class Groups for Snags area: (Class 1, 2, 3) Young Snags, and (Class 4, 5) old snags.

[3] Decay Class Groups for Down Material are: (Class 1, 2, 3) Young Material, and (Class 4, 5, 6) old material.

[4] Western Hemlock/Western Red Cedar-Sword Fern Plant Association has no forb cover requirement

Methodology and Scientific Accuracy

The Forest's timber type maps are used as the vegetation data base for the Tongass Forest Plan Revision. These maps were completed in 1978, and have been updated since then to account for land status changes and timber harvest activity. The timber type maps were digitized into a computer Geographic Information System data base to provide spatial data and quantitative analysis capabilities for the Revision. The timber type maps identify the following attributes which are pertinent to old growth identification and quantification: productivity, forest type, size classes (generally synonymous with age classes), strata classes (formerly called volume classes).

Productivity

The timber type maps separate forested lands into two major productivity classes: 1) productive lands, which have been inventoried as being capable of producing 20 cubic feet per acre of usable timber volume per year; 2) low productivity lands, which have been inventoried as not being capable of producing 20 cubic feet per acre of usable timber volume per year. The first category is usually called productive forested lands, and the second category unproductive forested lands. Both productive and unproductive forested lands contain old-growth forests. The unproductive forested lands would primarily be associated with some of the plant associations in the mixed conifer, mountain hemlock, and lodgepole pine plant association series (Martin, 1989). The productive forested lands would primarily be associated with plant associations in the western hemlock, western hemlock-Alaska cedar, Sitka spruce, western hemlock-red cedar, and mountain hemlock plant association series (Martin, 1989).

Forest Types

Forest types are identified for the productive forest lands, and include the following: hemlock (no distinction is made between western hemlock and mountain hemlock), spruce, hemlock/spruce, cedar (mixed cedar/hemlock stands are not identified in the Forest-wide GIS data base; these acres will be included in the hemlock type), red alder, and black cottonwood. Red alder is generally associated with early forest successional stages and is not considered an old-growth forest type. Black cottonwood is also generally associated with early forest successional stages; on some of the mainland rivers it may develop into a persistent stage and may be considered an old-growth cottonwood type.

Size Classes

Size classes identified for the productive forest lands include: currently non-stocked, seedling/sapling, pole timber, young-growth sawtimber, and old-growth sawtimber. For identifying old growth, only the old-growth sawtimber size class is used. A discussion of the characteristics of the old-growth sawtimber size class follows.

The timber inventory used 150 years as a breakpoint age for separating young growth (less than 150 years) and old growth (greater than 150 years). Even though 150 years was used as the breakpoint age, over 95 percent of the trees sampled in uncut timber stands were greater than 150 years. Most of these stands were uneven-aged stands well beyond 150 years.

There is no timber inventory age category for trees greater than 300 years, as tree ring counting stops when 300 is reached. However, a study of 1,234 trees, 11.0 inches and larger DBH, from random locations in old-growth mixed hemlock/spruce stands showed an average tree age at DBH of 282. Because trees in this forest type may take from 7 to 50 years to reach 4 1/2 feet in height (DBH), this may not be the true tree age. Therefore, the actual age of sample trees could have been 289 to more than 332 years. The same study indicated that an average of one tree per three acres is older than 600 years (Planning Record - National Old Growth Task Force).

In summary, most (about 95 percent) of the uncut stands identified in the timber inventory as old growth will be classified as uneven-aged stands and will have trees much older than 150 years.

A few stands identified as old growth on the timber type maps do not have the characteristics of old-growth stands. Most of these stands are located near Yakutat (and perhaps a few other places on the mainland) and represent the first trees to occupy sites after glaciers have receded. They are identified as old growth because tree ages are between 150 and 200 years. However, these stands are even-aged, and do not have many of the structural old-growth characteristics

associated with other old-growth stands in Southeast Alaska. Because they are even-aged, the stands have not developed patchy or multi-layered canopies, they have developed understory shrubs, but not a well-developed understory forb layer, and generally lack large diameter snags and downed woody logs.

Strata Classes

Productive forested lands are separated into four classes on the timber type maps commonly known as volume classes. The four volume classes are: Volume Class 4 = 8,000 to 20,000 board feet per acre; Volume Class 5 = 20,000 to 30,000 board feet per acre; Volume Class 6 = 30,000 to 50,000 board feet per acre; and Volume Class 7 = 50,000 + board feet per acre. The classes were delineated on aerial photos recognizing relative differences in stand characteristics which could be seen on aerial photos. However, differences in stand characteristics discernible on aerial photos may not always equate to the net volume per acre of the stand. "Volume class" is not necessarily an accurate representation of what the aerial photo interpreter was typing on the map. What was obviously an area of big, old trees on the photo may not represent 50,000 board feet net per acre. Therefore, the classes have now been termed strata classes instead of volume classes. Strata A is synonymous with volume class 4, Strata B is synonymous with volume class 5, Strata C is synonymous with volume class 6, Strata D is synonymous with volume class 7.

During the 1980's, 516 forest inventory plots were established to gather statistically reliable information on the timber production potential and standing volume on the Tongass's three administrative areas. Information gathered from the 516 forest inventory plots, when compared with the volume class information from the timber type maps, indicated that the strata classes on the timber type maps did not always coincide with the net volume from a specific forest inventory plot. The primary reasons for this variation are:

1. The timber type mapping assigned values for the polygon as-a-whole. A polygon is defined as an area of land (or stand of trees) identified with certain observable characteristics which make it different from adjacent areas of land (or stands of trees). The value of the polygon was based on the majority of the contents within its boundary. This meant that if the majority of the polygon was rated high volume and the forest inventory plot fell in a blowdown patch, or in the transition areas between the high volume polygon and one of lesser volume, the resultant forest inventory volume would not be the same as that of the timber type map.
2. The forest inventory plots were not designed to statistically sample the volume in the strata polygons on the timber type maps. Few of the forest inventory plots fell within the higher volume strata on these maps. The result is that the forest inventory plots neither verify nor refute any given timber type map polygon.
3. Old-growth forest conditions are naturally heterogeneous. Plots within these strata polygons will show variation due to the natural openings, second growth, multi-storied layering, variations in tree sizes, etc. One plot within a strata polygon containing old-growth forest conditions is not a representative sample of the entire polygon's characteristics.

The Timber Section of Chapter 3 of the Analysis of the Management Situation (1990, pp. 3-419 - 3-492) contains additional information discussing the variability of the strata classes, and ongoing work to obtain better information for the timber resources. Ongoing statistical analysis may show many stand characteristic correlations in each of the strata classes.

Unproductive Forested Land

Forest types, size classes, or strata classes are not identified for unproductive forested land, instead, the following categories are identified: low productivity due to alder, glacier, high elevation, low site index, muskeg, rock cover, slide zone, and willow. Unproductive forested land in areas of lower productivity due to alder, glacier, slide zone, and willow categories are generally younger stands of trees. Unproductive forested land in the high elevation, low site index, muskeg, and rock cover categories is generally old-growth.

The following approach was developed to display old-growth forest data for the Tongass National Forest using vegetation information available.

1. Use the existing timber type maps, digitized in the GIS data base, as the best available Forest-wide data source to identify old-growth forests.
2. Use the old-growth size class on the timber type maps for identifying old-growth stands, recognizing that most (estimated 95 percent) of the time the stands will be over 200 years old (Samson, et al., 1989).
3. Recognize two general productivity classes:
   a. Unproductive old growth, capable of producing less than 20 cubic feet per acre of usable timber volume per year. Additional breakdown of unproductive old growth by species or other groupings is not available in the GIS data base.
   b. Productive old growth, capable of producing 20 cubic feet or more per acre of usable timber volume per year. This class recognizes four Strata Classes for productive old growth (A, B, C, D), and four species or species groupings (cedar, hemlock, spruce, and hemlock/spruce).
4. Display old growth by five landscape locations: estuary fringe/beach fringe, riparian, upland below 800 feet elevation, upland from 800 to 1500 feet elevation, subalpine/alpine over 1500 feet elevation. Definitions for these landscape locations are provided later in this section. Old growth location in the landscape recognizes important ecological functions (Samson, et al., 1989). For example, riparian old growth includes fish habitat, riparian-associated wildlife habitat, specific plant associations, etc.
5. Display old growth distribution on the Forest by 21 ecological provinces.

Evaluations of old-growth stand sizes or patch sizes are not presented here. It is beyond the Forest's computing capability in GIS to perform a Forest-wide site-specific evaluation of patch size relationships.

Existing Old Growth

[Special note: The old-growth acres presented in the following tables will not add up exactly between all of the tables. Several computer programs were developed to obtain these acreages from the data base; these different programs result in small acreage differences. This is a result of digitizing and programming variables.]

Table 3-55 provides a general summary of the old growth acres on the Tongass National Forest.

Table 3-55

Acres of conifer and cottonwood old-growth forests on the Tongass National Forest (includes designated Wilderness)

Unproductive Conifer Old Growth (includes shorepine, and other unproductive acres of cedar, western and mountain hemlock, hemlock/spruce, and spruce)	3,581,215 acres
Productive Conifer Old Growth (includes productive cedar, western and mountain hemlock, hemlock/spruce, and spruce)	5,050,809 acres
Cottonwood	8,889 acres
Total Old Growth	**8,640,913 acres**

Source: Revision data base, Q200E, April 1991

The Revision data base does not contain species information for the unproductive conifer old growth acres. The productive conifer old growth acres can be divided into four species groups, and each species group can be divided into four strata classes. Table 3-56 displays this information. Of the 5.05 million acres of productive old-growth forest, less than one percent is cedar, with approximately 60 percent western and mountain hemlock, 38 percent hemlock/ spruce, and two percent spruce.

The four strata classes comprise the following percentages of the 5.05 million acres: Strata A - 50 percent, Strata B - 39 percent, Strata C - 9 percent, and Strata D - 2 percent.

Table 3-56

Productive conifer old growth acres by species and strata classes (includes designated Wilderness)

	Strata				Total Each
Species	**A**	**B**	**C**	**D**	**Species**
Cedar	35,112	982	0	0	**36,094**
Western & Mt. Hemlock	1,903,344	978,498	129,944	7,924	**3,019,710**
Hemlock/Spruce	573,312	974,149	289,489	69,221	**1,906,171**
Spruce	30,043	43,589	52,450	12,218	**138,300**
Total Each Strata	**2,541,811**	**1,997,218**	**471,883**	**89,363**	

Source: Revision data base, QOG, May, 1991

Table 3-57 displays conifer old growth acres on the Tongass National Forest by five landscape locations:

- Estuary Fringe/Coast or Beach Fringe. Estuary fringe is defined as the area of land within a 1,000 foot slope distance inland from the mean high tide around all identified estuary areas in the Revision data base. Coast or beach fringe is defined as the area of land within a 500-foot slope distance inland from the mean high tide along the entire coastline, but not including the area of land already within the estuary fringe so that acres are not double-counted.
- Riparian. This is defined as a minimum 100-foot wide zone along both sides of all streams that have been digitized in the Revision data base; some stream channel types

have a 150-foot-wide zone along both sides; if riparian soil mapping units are wider than the 100- or 150-foot zone, then the width of the soil mapping unit is the width of the zone. The riparian unit does not include any acres already included within the estuary fringe or the beach fringe.

- Upland less than 800 feet in elevation. This is defined as all upland areas below 800 feet, but not including any acres already included within the estuary fringe, beach fringe, or riparian units.
- Upland from 800 to 1,500 feet in elevation. This is defined as all upland areas from 800 feet to 1,500 feet in elevation, but not including any acres within the previous units if there is overlap.
- Subalpine/Alpine. This is defined as all upland areas over 1,500 feet in elevation, but not including any acres within the previous units if there is overlap.

Of the total Tongass acres, 59 percent is classified as forested land (conifer forest). Productive conifer old growth makes up about 30 percent of the total Tongass acres, unproductive old growth makes up about 21 percent of the total Tongass acres, and the remaining 8 percent is forested land ranging in ages from currently non-stocked areas to young sawtimber. Productive old growth makes up about 59 percent of the total beach fringe and estuary fringe acres, 42 percent of the total riparian acres, 46 percent of the upland acres below 800 feet elevation, 46 percent of the upland acres between 800 and 1500 feet elevation, and 8 percent of the acres above 1500 feet elevation.

Table 3-58 displays productive and unproductive old growth acres in each of the 21 ecological provinces. All of the provinces contain examples of each of the productive old growth strata classes, except for three provinces which do not have Strata D. The lack of Strata D in two of these provinces (Yakutat Uplands and West Chichagof Island) is due to natural conditions. The lack of Strata D in the East Baranof Island Province is probably due to natural low occurrence plus timber harvest which may have removed some stands occurring in this area. Sixty-four percent of the Strata D old growth acres occur in the two Prince of Wales Island provinces. The Admiralty Island Province and North Central Prince of Wales Island Province contain 39 percent of all Strata C old growth acres. Admiralty Island, North Central Prince of Wales Island, and Revilla/Cleveland contain thirty-seven percent of all Strata B old growth acres in three provinces[a]. Five provinces (East Chichagof Island, Admiralty Island, North Central Prince of Wales Island, Revilla/Cleveland, and South Misty) each contain over 200,000 acres of Strata A old growth, and this amounts to 43 percent of all Strata A acres.

Thirty-eight percent of the productive old-growth is located within designated Wilderness, National Monuments, and legislated LUD II areas with all productive old-growth strata classes being represented. Table 3-59 displays the acres of old growth located within these designated areas.

Table 3-57

Conifer old-growth acres (including designated Wilderness[1]) on the Tongass National Forest in 1990 within five landscape positions (in acres)

	Beach Fr.& Estuary Fr.	Riparian	Upland <800 Ft. Elev.	Upland 800-1500 Ft. Elev.	Upland >1500 Elev.	Total Tongass
Productive Conifer Old Growth						
Strata A	213,374	164,363	1,070,800	708,178	362,714	**2,519,429**
Strata B	198,294	171,591	869,001	564,236	171,312	**1,974,434**
Strata C	38,559	56,667	233,768	118,577	20,632	**468,203**
Strata D	8,158	12,587	49,249	15,908	2,841	**88,743**
Total	**458,385**	**405,208**	**2,222,818**	**1,406,899**	**557,499**	**5,050,809**
Unproductive Conifer Old Growth	99,075	172,454	1,382,816	814,283	1,112,587	3,581,215

Source: Revision data base, Q200E, April 1991.

[1] Estuary fringe and riparian acres in Wilderness areas are not available. The acres which would have been in estuary and riparian areas in Wilderness are included in the upland acres.

Table 3-58

Existing conifer old growth in 21 Ecological Provinces[1] (in acres)

Ecological Province	Strata A	Productive Old Growth Strata B	Strata C	Strata D	Total Productive Old Growth	Unproductive Old Growth
1 Yakutat Forelands[2]	12,317	10,860	22,895	3,065	49,137	35,927
2 Yakutat Uplands[2]	12,849	9,868	2,020	0	24,737	7,933
3 East Chichagof Island	219,723	154,005	34,036	720	408,484	153,960
4 West Chichagof Island	49,788	17,525	2,159	0	69,472	101,472
5 East Baranof Island	58,336	34,747	2,204	0	95,287	72,257
6 West Baranof Island	152,078	60,018	4,186	60	216,342	193,818
7 Admiralty Island	243,269	245,348	90,981	7,195	586,793	219,190
8 Lynn Canal	84,718	56,384	11,575	240	152,917	100,875
9 Northern Coast Range	159,978	138,950	22,602	415	321,945	135,170
10 Kupreanof/Mitkof	183,583	110,058	18,385	1,420	313,446	278,810
11 Kuiu Island	102,758	157,389	31,373	5,802	297,322	91,402
12 Central Coast Range	127,224	96,408	17,934	481	242,047	159,276
13 Etolin Island & Vicinity	130,289	85,153	12,020	661	228,123	187,590
14 North Central POW	208,083	213,364	93,072	33,071	547,590	414,436
15 Revilla/Cleveland	221,939	267,613	32,368	1,780	523,700	460,297
16 Southern Outer Islands	56,957	45,602	11,279	2,124	115,962	70,764
17 Dall Island & Vicinity	27,552	29,078	6,747	1,576	64,953	29,898
18 South POW Island	70,850	48,002	25,227	23,754	167,833	2,604
19 North Misty	119,962	64,347	10,677	3,219	198,205	244,428
20 South Misty	200,773	96,887	11,365	2,640	311,665	326,556
21 Ice Fields[2]	76,404	32,779	5,099	520	114,802	143,241

Source: Revision data base, Q200E , April 1991.

[1] See map in the Biological Diversity section.

[2] These acres represent the oldest tree stands in these provinces, however as previously discussed they may not contain all of the characteristics normally associated with old-growth.

Table 3-59

Existing conifer old growth within designated Wilderness, National Monuments, and legislated LUD II's (in acres)

Monument or LUD II Area	Strata A	Productive Old Growth Strata B	Strata C	Strata D	Total Productive Old Growth	Unproductive Old Growth
LUD II Areas						
Berner's Bay	7,826	4,602	540	0	12,968	5,045
Pt. Adolphus/Mud Bay	15,913	18,593	3,542	0	38,048	13,931
Lisianski River/Upper Hoonah Sound	26,793	12,110	2,499	0	41,402	24,949
Kadashan	9,795	7,756	2,519	0	20,070	8,755
Trap Bay	1,819	1,659	739	0	4,217	659
Yakutat[1]	5,826	2,068	7,463	1,162	16,519	12,535
E. Kuiu Islands	499	1,756	519	0	2,774	319
Anan Creek	8,663	7,563	20	0	16,246	16,506
Salmon Bay	2,068	1,552	854	0	4,474	4,519
Mt. Calder/Mt. Holbrook	12,446	14,955	5,419	683	33,503	15,438
Outside Islands	26,175	15,605	3,326	279	45,385	25,981
Nutkwa	2,460	2,980	2,860	4,521	12,821	5,061
Naha	4,619	10,357	2,659	120	17,755	10,097
Wilderness/Monument						
Tracy Arm-Fords Terror	23,183	9,834	862	0	33,879	28,969
Chuck River	12,995	28,652	1,643	160	43,450	8,789
Endicott River	10,021	3,821	1,141	0	14,983	19,877
Admiralty/Kootznoowoo	225,124	228,715	83,938	6,115	543,892	197,589
Pleasant/Lemesurier/Inian	6,599	3,419	1,579	0	11,597	7,943
W. Chichagof-Yakobi	44,931	12,705	3,019	0	60,655	105,803
South Baranof	47,510	15,696	1,760	0	64,966	80,576
Russell Fiord[1]	13,418	9,286	1,479	0	24,183	5,964
Tebenkof Bay	10,283	33,231	3,418	0	46,932	5,629
Kuiu	14,436	21,254	1,944	40	37,674	10,497
Petersburg Creek-Duncan	10,999	10,637	800	280	22,716	20,099
South Etolin	20,231	13,545	1,736	260	35,772	30,120
Stikine-Leconte	32,107	30,628	7,465	20	70,220	34,323
Coronation/Warren/Maurelle	10,658	10,057	1,256	60	22,031	8,762
Karta River	4,319	9,118	5,139	2,619	21,195	11,396
S. Prince of Wales	19,482	8,154	3,218	1,300	32,154	47,038
Misty Fiords	329,283	197,264	24,817	5,058	556,422	645,886
Grand Total	**960,481**	**747,572**	**178,173**	**22,677**	**1,908,903**	**1,413,055**

Source: Revision data base, Q200ELUD, May 1991.

[1] These acres represent the oldest tree stands in these provinces, however as previously discussed they may not contain all of the characteristics normally associated with old-growth.

Additional Information

There are 3.14 million acres of productive old growth outside of Wilderness, National Monuments, and Legislated LUD II areas. About 82 percent (2.562 million acres) of these productive old growth acres are tentatively suitable for timber harvesting on a sustained-yield basis. The current Forest Plan has 1.94 million acres suitable-available for timber harvest (incorporates effects of the Tongass Timber Reform Act).

About 106,000 acres of timber have been harvested from 1979 to 1990. About 358,400 acres of productive old growth have been harvested on the Tongass since 1954, which is when the two long-term sale contracts began. Most of the timber harvesting has occurred in stands with higher volumes per acre, generally over 30,000 board feet (30 MBF) per acre. The timber section of this Chapter provides additional information on timber harvesting. Currently there are 5.05 million acres of productive old growth on the Tongass; adding the 358,400 acres that have been harvested since 1954, it is estimated that there were about 5.41 million acres of productive old-growth forest in 1954.

Appendix L provides tables displaying old growth acres and acres which have been harvested within each of the Alaska Department of Fish and Game Wildlife Analysis Areas.

Another land use designation preserves examples of several old growth types. The six Research Natural Areas are:

- Pack Creek RNA. Established to represent old-growth hemlock/spruce forest types in northern Southeast Alaska. Pack Creek is currently being considered for delisting as a RNA, but a new RNA proposal (Swan Cove) is being considered to replace Pack Creek (see RNA section).
- Cape Fanshaw RNA. Established to represent old-growth Alaska yellow-cedar and western hemlock forests.
- Red River RNA. Established to represent the northern range of old-growth silver fir.
- Dog Island RNA. Established to represent a small island with the northern limit of Pacific yew and associated unproductive old growth and low volume mixed conifer old growth in southern Southeast Alaska.
- Limestone RNA. Established to represent typical vegetation types common to the Juneau mainland.
- Old Tom Creek RNA. Established to represent a cedar/hemlock old-growth forest. It also contains riparian spruce old growth.

State and Private Lands. Under provisions of the Alaska Statehood Act, the State has had the right to select federal land for State ownership. Under provisions of the Alaska Native Claims Settlement Act, Native Corporations have had the right to select lands for Native ownership. To date, about 886,600 acres of National Forest land in Southeast Alaska has been conveyed to either the State or to Native Corporations. About 81 percent of these conveyed acres (714,400 acres) are considered commercial forest land capable of supporting timber harvesting. Most of the commercial forest land acres were old growth at the time of conveyance. About 65 percent (464,200 acres) of the commercial forest lands have been harvested. Appendix L provides information on the acres of State and Private lands within each of the Alaska Department of Fish and Game Wildlife Analysis Areas.

Research Needs

The prospect of global climatic warming caused by a buildup of carbon dioxide and other substances in the upper atmosphere has helped focus much scientific attention on how human actions can modify global climate. Much recent debate has focused on how both the growth and clearing of rain forests affect atmospheric carbon.

In temperate forests studied to date, deforestation and subsequent management have resulted in a net emission of carbon to the atmosphere due to lower equilibrium carbon pools (in trees and soil) and a more rapid turnover of carbon. But, because of the small land area involved, and the high degree of reforestation following logging, effects of land use practices in the temperate rain forest zone of Southeast Alaska are expected to have little effect on global atmospheric carbon. Basic research on decomposition, microclimate and soils changes with logging is needed to better understand the productivity potential (in the sense of carbon utilization) of the full range of temperate rain forest sites, and to better predict what impact land-use practices may have on atmospheric carbon (Alaback, 1989).

Old-Growth Forests

Environmental Consequences

Direct, Indirect and Cumulative Effects

This section discusses the effect that each alternative will have on old-growth forests. The environmental consequences will focus on the 5.05 million acres of productive old-growth forest, because these acres are thought to provide the important old-growth associated wildlife habitat and are at the center of the public issue involving old-growth on the Tongass. Environmental consequences will be displayed in relation to the amount of productive old-growth forest which existed on the Tongass in 1954 to show cumulative effects of timber harvesting from the beginning of the two long-term timber sale contracts.

Under all alternatives, the continuation of timber harvesting will result in declines in the amount of remaining old growth. The rate and amount of decline varies with the amount of timber harvested. In approximately 150 years, each alternative will reach a "regulated forest" condition on lands managed for timber harvest. This means that from that time on, the harvest level called for by the alternative could be sustained indefinitely from lands already harvested (second growth). At that time, no additional old growth would need to be harvested to maintain the planned timber supply. The fifteenth decade (150 years) in the following analysis can be used to approximate this point in time.

Effects of Alternatives

In 1954, there were an estimated 5.44 million acres of productive old-growth forest on the Tongass. Table 3-60 displays the percent of 1954 productive old-growth forest acres remaining on the Tongass in 1990 and for each alternative for the years 2000, 2010, 2040, and 2150. The amount of old-growth forest remaining in each alternative is directly related to the amount of timber harvesting associated with that alternative. Alternative D, with the highest amount of timber harvesting allowed, has the lowest amount of old growth remaining after 150 years. Alternative A has the least amount of timber harvesting and the highest amount of old growth remaining. The amount of productive old growth remaining on the Tongass by the year 2150 for each alternative is: A = 4.2 million acres; B = 4.0 million acres; C = 3.7 million acres; D = 3.6 million acres; P = 3.8 million acres.

The amount of timber harvesting by old-growth strata class is displayed in Table 3-60. From 1954 to the present, most of the timber harvesting has occurred in strata classes C and D; it is estimated that 39 percent of strata C and D could have been harvested. Timber type maps have only been available since 1974 on some parts of the Forest. Portions of stands within timber type polygon have been harvested since the maps were made. Since the Forest is heterogenuous in nature, saying that a specific number of acres of a certain volume class have been harvested since 1954 is not possible since the type maps have only existed for the last 15 years and entire polygons are not harvested. Since 1978, approximately 33,000 acres of timber harvest have occurred in polygons typed as Volume Class 5 and 1,000 acres have been harvested from polygons typed as Volume Class 4. The timber type maps use volume classes rather than strata classes. Since the average volume per acre harvested since 1954 has been more than 30,000 board feet per acre (Volume Class 6 or 7), a maximum potential effects was assumed for 1954 to 1990 showing all of the harvest occurring in Strata C and D in Table 3-60.

Table 3-60

Estimated changes in productive old-growth forest acres compared to 1954, (includes designated Wilderness)

	Percent of 1954 Productive Old Growth Remaining				
	Alt. A	**Alt. B**	**Alt. C**	**Alt. D**	**Alt. P**
Total Old Growth: 1954: 5,438,547 acres					
% remaining in year 1990	93	93	93	93	93
% remaining in year 2000	91	91	90	90	91
% remaining in year 2010	89	89	87	87	88
% remaining in year 2040	82	81	77	76	78
% remaining in year 2150	77	74	68	67	70
Strata A Old Growth: 1954: 2,521,693 acres					
% remaining in year 1990	100	100	100	100	100
% remaining in year 2000	99	99	99	99	99
% remaining in year 2010	98	98	97	98	98
% remaining in year 2040	91	90	87	87	89
% remaining in year 2150	85	82	77	75	80
Strata B Old Growth: 1954: 1,997,193 acres					
% remaining in year 1990	100	100	100	100	100
% remaining in year 2000	97	97	95	95	95
% remaining in year 2010	95	93	92	92	92
% remaining in year 2040	86	84	79	78	79
% remaining in year 2150	81	78	70	69	71
Strata C Old Growth: 1954: 765,632 acres					
% remaining in year 1990	61	61	61	61	61
% remaining in year 2000	58	57	57	56	58
% remaining in year 2010	52	52	48	47	50
% remaining in year 2040	50	48	45	43	46
% remaining in year 2150	48	45	39	39	41
Strata D Old Growth: 1954: 154,029 acres					
% remaining in year 1990	61	61	61	61	61
% remaining in year 2000	56	57	54	55	54
% remaining in year 2010	55	54	48	49	49
% remaining in year 2040	54	53	48	48	49
% remaining in year 2150	40	39	32	31	33

Source: Revision Data base, FORPLAN Analysis June 1991

By the year 2150, the amount of strata A old growth remaining ranges from 2.14 million acres in Alternative A to 1.89 million acres in Alternative D; the amount of strata B old growth remaining ranges from 1.62 million acres in Alternative A to 1.38 million acres in Alternative D; the amount of strata C old growth remaining ranges from 370 thousand acres in Alternative A to 300 thousand acres in Alternatives C and D; the amount of strata D old growth remaining ranges from 62 thousand acres in Alternative A to 48 thousand acres in Alternative D.

Table 3-61 displays the amount of timber harvesting by old-growth strata class for each of the Forest Administrative Areas. In all Alternatives, the Chatham Area has a higher percentage of old growth remaining than the Ketchikan and Stikine Areas.

Table 3-61

Estimated changes in productive old-growth forest acres compared to 1954, for each Administrative Area (includes designated Wilderness)

Area & Strata	Percent of 1954 Productive Old Growth Remaining Alt A	Alt B	Alt C	Alt D	Alt P
Chatham					
Strata A; 1954: 1,020,228 acres					
% remaining 1990	100	100	100	100	100
% remaining 2000	100	100	100	100	100
% remaining 2010	100	100	99	100	100
% remaining 2040	97	96	95	95	98
% remaining 2150	93	92	92	88	94
Strata B; 1954: 742,360 acres					
% remaining 1990	100	100	100	100	100
% remaining 2000	98	97	96	97	96
% remaining 2010	96	95	93	94	93
% remaining 2040	92	89	86	86	85
% remaining 2150	90	87	81	82	81
Strata C; 1954: 260,216 acres					
% remaining 1990	75	75	75	75	75
% remaining 2000	75	74	73	71	74
% remaining 2010	72	70	71	68	73
% remaining 2040	72	70	69	66	69
% remaining 2050	72	72	70	70	70
Strata D; 1954: 15,876 acres					
% remaining 1990	74	74	74	74	74
% remaining 2000	74	74	73	74	73
% remaining 2010	72	72	70	70	71
% remaining 2040	72	72	70	70	70
% remaining 2150	72	72	70	70	70
Ketchikan					
Strata A; 1954: 901,346 acres					
% remaining 1990	100	100	100	100	100
% remaining 2000	98	98	98	99	99
% remaining 2010	98	98	97	97	97
% remaining 2040	88	86	82	81	83
% remaining 2150	82	81	71	71	74
Strata B; 1954: 760,766 acres					
% remaining 1990	100	100	100	100	100
% remaining 2000	97	96	94	93	94
% remaining 2010	95	93	92	92	93
% remaining 2040	84	82	75	76	77
% remaining 2150	77	74	63	62	65

Table 3-61 (continued)

Area & Strata	Alt A	Alt B	Alt C	Alt D	Alt P
	Percent of 1954 Productive Old Growth Remaining				
Strata C; 1954: 345,550 acres					
% remaining 1990	57	57	57	57	57
% remaining 2000	53	53	53	53	54
% remaining 2010	44	44	37	37	38
% remaining 2040	42	40	34	34	36
% remaining 2150	39	37	29	30	32
Strata D; 1954: 122,018 acres					
% remaining 1990	57	57	57	57	57
% remaining 2000	51	52	48	50	49
% remaining 2010	50	49	42	43	43
% remaining 2040	49	48	42	43	43
% remaining 2150	36	34	26	26	28
Stikine					
Strata A; 1954: 600,119 acres					
% remaining 1990	100	100	100	100	100
% remaining 2000	98	97	98	98	98
% remaining 2010	96	95	94	94	95
% remaining 2040	86	84	83	81	84
% remaining 2150	74	68	62	59	65
Strata B; 1954: 494,067 acres					
% remaining 1990	100	100	100	100	100
% remaining 2000	97	97	94	94	95
% remaining 2010	92	91	89	87	90
% remaining 2040	80	77	72	69	73
% remaining 2150	75	71	64	59	67
Strata C;1954: 159,866 acres					
% remaining 1990	51	51	51	51	51
% remaining 2000	43	42	42	41	43
% remaining 2010	41	40	38	39	38
% remaining 2040	37	34	31	29	33
% remaining 2150	35	32	29	27	31
Strata D; 1954: 16,135 acres					
% remaining 1990	52	52	52	52	52
% remaining 2000	52	52	52	52	52
% remaining 2010	52	52	48	48	50
% remaining 2040	52	52	48	48	50
% remaining 2150	24	24	21	23	23

Source: Revision Data base, FORPLAN, June 1991.

Landscape Location of Old Growth

Table 3-62 displays the percent of 1954 productive old-growth forest acres remaining on the Tongass within five landscape locations for each alternative.

Beach Fringe and Estuary. Alternatives A, B, C and P have no scheduled timber harvesting in the beach fringe and estuary areas and retain the highest amounts of old growth (94 percent of 1954 levels or about 508,000 acres). Alternative D schedules timber harvesting in the beach fringe and estuary and has the lowest amount of old growth remaining (67 percent of 1954 levels by the year 2150, or about 362,000 acres).

Riparian. Some harvesting may occur in riparian areas in individual projects following the standards and guidelines appropriate for riparian areas; the Fish section provides additional information. The estimated amount of productive old growth remaining in riparian areas by the year 2150 for each alternative is: Alternative A = 86 percent of 1954 levels or about 396,000 acres; Alternative B = 85 percent of 1954 levels or about 391,000 acres; Alternatives C, D, and P = 84 percent of 1954 levels or about 387,000 acres.

Upland less than 800 feet. All alternatives schedule timber harvesting in upland areas of less than 800 feet elevation. The amount of productive old growth remaining by the year 2150 for each alternative is: Alternative A = 72 percent of 1954 levels or about 1.795 million acres: Alternative B = 69 percent of 1954 levels or about 1.721 million acres; Alternative C = 61 percent of 1954 levels or about 1.521 million acres; Alternatives D and P = 63 percent of 1954 levels or about 1.571 million acres.

Upland 800 to 1500 feet. All alternatives schedule timber harvesting in upland areas between 800 and 1500 feet elevation. The amount of productive old growth remaining by the year 2150 for each alternative is: Alternative A = 78 percent of 1954 levels or about 1.132 million acres: Alternative B = 74 percent of 1954 levels or about 1.074 million acres; Alternative C = 66 percent of 1954 levels or about 0.958 million acres; Alternatives D and P = 69 percent of 1954 levels or about 1.002 million acres.

Subalpine/Alpine. All alternatives schedule some timber harvesting in subalpine/alpine acres. The amount of productive old growth remaining by the 2150 for each alternative is: Alternative A = 81 percent of 1954 levels or about 459,000 acres: Alternative B = 78 percent of 1954 levels or about 442,000 acres; Alternative C = 71 percent of 1954 levels or about 402,000 acres; Alternative D = 72 percent of 1954 levels or about 408,000 acres; Alternative P = 73 percent of 1954 levels or about 414,000 acres.

Future Condition When second-growth timber in the Forest begins to reach harvestable size, the need for old growth to sustain harvest levels will decrease. In approximately 150 years, each alternative will reach a point where no more old-growth forest is required to sustain the desired timber supply. At that time, the remaining old growth could be maintained in perpetuity while also maintaining the level of timber supply. Based on Table 3-60, there will be a range of 67 to 77 percent (3.6 to 4.2 million acres) of the productive old-growth forests remaining at that time (based on the 1954 level of 5.44 million acres).

Cumulative Effects on Old Growth by Ecological Province

Tables 3-63 to 3-67 display how old growth is anticipated to change, by Strata Class, within each of the 21 Ecological Provinces by Alternative after the first, second, fifth, and fifteenth decades.

Table 3-62

Estimated changes in productive conifer old growth acres from 1954 conditions for five landscape positions (includes designated Wilderness)

		Percent of 1954 Old Growth Remaining																				
Productive Old Growth	Acres in 1954	1990	A 2000	A 2010	A 2040	A 2150	B 2000	B 2010	B 2040	B 2150	C 2000	C 2010	C 2040	C 2150	D 2000	D 2010	D 2040	D 2150	P 2000	P 2010	P 2040	P 2150
Beach & Estuary																						
Strata A	233,936	100	100	100	100	100	100	100	100	100	100	100	100	100	99	97	86	73	100	100	100	100
Strata B	221,820	100	100	100	100	100	100	100	100	100	100	100	100	100	95	92	80	72	100	100	100	100
Strata C	70,537	60	60	60	60	60	60	60	60	60	60	60	60	60	55	45	41	36	60	60	60	60
Strata D	14,447	60	60	60	60	60	60	60	60	60	60	60	60	60	54	48	47	30	60	60	60	60
Total	**540,741**	**94**	**94**	**94**	**94**	**94**	**94**	**94**	**94**	**94**	**94**	**94**	**94**	**94**	**91**	**87**	**77**	**67**	**94**	**94**	**94**	**94**
Riparian																						
Strata A	166,224	100	100	99	97	95	100	99	97	95	100	99	96	93	100	99	96	92	100	99	97	94
Strata B	174,889	100	99	99	97	96	99	99	96	95	99	98	95	93	99	98	95	93	99	98	95	93
Strata C	97,724	61	61	60	59	59	60	60	59	58	60	59	58	58	60	59	58	58	61	59	59	58
Strata D	21,452	61	60	60	60	58	60	60	60	58	60	59	59	57	60	59	59	57	60	59	59	57
Total	**460,289**	**90**	**90**	**89**	**87**	**86**	**89**	**89**	**87**	**85**	**89**	**89**	**86**	**84**	**89**	**88**	**86**	**84**	**89**	**89**	**86**	**84**
Upland less than 800 ft. elevation																						
Strata A	1,088,979	100	99	98	89	81	99	98	87	78	99	97	84	71	99	97	85	72	99	97	86	75
Strata B	892,335	100	97	93	83	78	96	92	81	74	94	90	74	64	94	91	76	67	94	90	75	65
Strata C	425,673	58	55	50	48	45	54	49	46	42	54	46	42	37	54	46	43	39	55	47	43	39
Strata D	87,186	58	52	50	49	31	52	50	49	30	49	41	41	21	53	48	48	34	50	43	43	22
Total	**2,494,174**	**91**	**89**	**86**	**78**	**72**	**88**	**85**	**76**	**69**	**87**	**84**	**72**	**61**	**88**	**84**	**73**	**63**	**88**	**84**	**73**	**63**
Upland 800-1500 ft. elevation																						
Strata A	707,578	100	99	98	90	83	99	98	88	80	99	97	85	74	99	98	87	75	99	97	88	77
Strata B	568,674	100	97	94	84	79	96	93	82	75	94	91	76	66	95	92	78	69	94	91	76	68
Strata C	154,186	78	73	64	61	57	72	63	58	53	72	58	52	43	71	59	53	48	73	60	54	46
Strata D	21,025	78	72	70	69	51	72	69	68	49	68	61	61	39	67	54	54	21	69	62	62	41
Total	**1,451,464**	**97**	**94**	**92**	**84**	**78**	**94**	**91**	**82**	**74**	**93**	**89**	**77**	**66**	**94**	**90**	**79**	**69**	**94**	**90**	**79**	**69**
Over 1500 ft. elevation																						
Strata A	365,435	100	99	99	93	88	99	98	92	85	99	98	89	81	99	98	90	81	99	98	91	83
Strata B	173,732	100	96	93	81	74	95	91	78	70	93	89	70	59	93	89	72	61	93	89	71	61
Strata C	24,130	93	81	60	52	43	79	57	44	32	78	44	30	10	76	45	31	17	81	50	35	17
Strata D	3,323	93	87	85	84	66	87	84	83	64	83	76	76	54	65	33	32	50	84	77	77	56
Total	**566,620**	**100**	**98**	**95**	**87**	**81**	**97**	**94**	**85**	**78**	**96**	**93**	**81**	**71**	**97**	**93**	**82**	**72**	**97**	**93**	**83**	**73**

Source: Revision Data base, June 1991

Table 3-63

Change in Old Growth acreage over 150 years within each of 21 Ecological Provinces, for Alternative A

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
1	A	12,317	0	0	739	739	12,317	12,317	11,578	11,578
1	B	10,860	0	714	1,893	2,453	10,860	10,146	8,967	8,407
1	C	22,895	0	2,990	2,990	3,228	22,895	19,905	19,905	19,667
1	D	3,065	0	0	0	0	3,065	3,065	3,065	3,065
1	**Total**	**49,137**	**0**	**3,704**	**5,622**	**6,420**	**49,137**	**45,433**	**43,515**	**42,717**
2	A	12,849	0	0	0	0	12,849	12,849	12,849	12,849
2	B	9,868	0	0	0	0	9,868	9,868	9,868	9,868
2	C	2,020	0	0	0	0	2,020	2,020	2,020	2,020
2	D	0	0	0	0	0	0	0	0	0
2	**Total**	**24,737**	**0**	**0**	**0**	**0**	**24,737**	**24,737**	**24,737**	**24,737**
3	A	219,723	0	0	17,249	38,002	219,723	219,723	202,474	181,721
3	B	154,005	11,197	17,228	24,016	28,691	142,808	136,777	129,989	125,314
3	C	34,036	687	873	1,033	3,816	33,349	33,163	33,003	30,220
3	D	720	10	109	109	178	710	611	611	542
3	**Total**	**408,484**	**11,894**	**18,210**	**42,407**	**70,687**	**396,590**	**390,274**	**366,077**	**337,797**
4	A	49,788	0	0	0	0	49,788	49,788	49,788	49,788
4	B	17,525	0	0	200	200	17,525	17,525	17,325	17,325
4	C	2,159	0	0	0	0	2,159	2,159	2,159	2,159
4	D	0	0	0	0	0	0	0	0	0
4	**Total**	**69,472**	**0**	**0**	**200**	**200**	**69,472**	**69,472**	**69,272**	**69,272**
5	A	58,336	0	0	2,480	2,480	58,336	58,336	55,856	55,856
5	B	34,747	3,304	4,248	9,687	10,507	31,443	30,499	25,060	24,240
5	C	2,204	88	117	117	580	2,116	2,087	2,087	1,624
5	D	0	0	0	0	0	0	0	0	0
5	**Total**	**95,287**	**3,392**	**4,365**	**12,284**	**13,567**	**91,895**	**90,922**	**83,003**	**81,720**
6	A	152,078	0	0	4,044	4,580	152,078	152,078	148,034	147,498
6	B	60,018	1,402	1,402	3,131	3,151	58,616	58,616	56,887	56,867
6	C	4,186	20	20	20	220	4,166	4,166	4,166	3,966
6	D	60	0	0	0	0	60	60	60	60
6	**Total**	**216,342**	**1,422**	**1,422**	**7,195**	**7,951**	**214,920**	**214,920**	**209,147**	**208,391**
7	A	243,269	0	0	519	4,668	243,269	243,269	242,750	238,601
7	B	245,348	1,263	1,263	1,263	2,205	244,085	244,085	244,085	243,143
7	C	90,981	0	561	561	561	90,981	90,420	90,420	90,420
7	D	7,195	20	20	20	20	7,175	7,175	7,175	7,175
7	**Total**	**586,793**	**1,283**	**1,844**	**2,363**	**7,454**	**585,510**	**584,949**	**584,430**	**579,339**
8	A	84,718	0	0	2,279	2,578	84,718	84,718	82,439	82,140
8	B	56,384	140	760	12,998	13,414	56,244	55,624	43,386	42,970
8	C	11,575	0	799	978	2,957	11,575	10,776	10,597	8,618
8	D	240	0	0	0	0	240	240	240	240
8	**Total**	**152,917**	**140**	**1,559**	**16,255**	**18,949**	**152,777**	**151,358**	**136,662**	**133,968**

Table 3-63 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
9	A	159,978	0	0	2,422	13,435	159,978	159,978	157,556	146,543
9	B	138,950	453	2,533	9,460	10,582	138,497	136,417	129,490	128,368
9	C	22,602	135	2,312	2,589	3,132	22,467	20,290	20,013	19,470
9	D	415	0	116	116	116	415	299	299	299
9	**Total**	**321,945**	**588**	**4,961**	**14,587**	**27,265**	**321,357**	**316,984**	**307,358**	**294,680**
10	A	183,583	0	4,889	32,889	56,948	183,583	178,694	150,694	126,635
10	B	110,058	6,187	6,860	29,702	34,849	103,871	103,198	80,356	75,209
10	C	18,385	3,641	3,641	4,643	5,544	14,744	14,744	13,742	12,841
10	D	1,420	0	0	0	80	1,420	1,420	1,420	1,340
10	**Total**	**313,446**	**9,828**	**15,390**	**67,234**	**97,421**	**303,618**	**298,056**	**246,212**	**216,025**
11	A	102,758	0	0	7,107	19,464	102,758	102,758	95,651	83,294
11	B	157,389	7,877	21,801	30,689	36,621	149,512	135,588	126,700	120,768
11	C	31,373	1,745	5,146	10,099	11,881	29,628	26,227	21,274	19,492
11	D	5,802	0	0	0	3,997	5,802	5,802	5,802	1,805
11	**Total**	**297,322**	**9,622**	**26,947**	**47,895**	**71,963**	**287,700**	**270,375**	**249,427**	**225,359**
12	A	127,224	316	4,901	10,094	19,021	126,908	122,323	117,130	108,203
12	B	96,408	2,303	2,303	12,458	16,911	94,105	94,105	83,950	79,497
12	C	17,934	2,867	2,867	3,416	3,416	15,067	15,067	14,518	14,518
12	D	481	0	0	0	199	481	481	481	282
12	**Total**	**242,047**	**5,486**	**10,071**	**25,968**	**39,547**	**236,561**	**231,976**	**216,079**	**202,500**
13	A	130,289	8,672	12,688	27,122	50,651	121,617	117,601	103,167	79,638
13	B	85,153	40	6,988	23,904	31,583	85,113	78,165	61,249	53,570
13	C	12,020	3,979	3,979	4,490	4,918	8,041	8,041	7,530	7,102
13	D	661	0	0	0	160	661	661	661	501
13	**Total**	**228,123**	**12,691**	**23,655**	**55,516**	**87,312**	**215,432**	**204,468**	**172,607**	**140,811**
14	A	208,083	12,240	13,179	76,506	87,227	195,843	194,904	131,577	120,856
14	B	213,364	10,873	21,888	72,536	86,464	202,491	191,476	140,828	126,900
14	C	93,072	6,018	33,103	34,811	40,433	87,054	59,969	58,261	52,639
14	D	33,071	6,131	8,482	9,400	17,420	26,940	24,589	23,671	15,651
14	**Total**	**547,590**	**35,262**	**76,652**	**193,253**	**231,544**	**512,328**	**470,938**	**354,337**	**316,046**
15	A	221,939	1,704	5,947	12,030	45,515	220,235	215,992	209,909	176,424
15	B	267,613	5,835	13,021	23,454	61,563	261,778	254,592	244,159	206,050
15	C	32,368	516	1,919	6,100	7,020	31,852	30,449	26,268	25,348
15	D	1,780	0	0	0	240	1,780	1,780	1,780	1,540
15	**Total**	**523,700**	**8,055**	**20,887**	**41,584**	**114,338**	**515,645**	**502,813**	**482,116**	**409,362**
16	A	56,957	2,437	2,437	7,324	7,923	54,520	54,520	49,633	49,034
16	B	45,602	5,419	5,419	9,914	10,254	40,183	40,183	35,688	35,348
16	C	11,279	2,904	3,352	4,333	4,333	8,375	7,927	6,946	6,946
16	D	2,124	365	365	365	1,423	1,759	1,759	1,759	701
16	**Total**	**115,962**	**11,125**	**11,573**	**21,936**	**23,933**	**104,837**	**104,389**	**94,026**	**92,029**

Table 3-63 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
17	A	27,552	259	259	3,941	6,457	27,293	27,293	23,611	21,095
17	B	29,078	140	140	5,454	9,508	28,938	28,938	23,624	19,570
17	C	6,747	14	99	1,516	2,474	6,733	6,648	5,231	4,273
17	D	1,576	0	0	0	1,057	1,576	1,576	1,576	519
17	**Total**	**64,953**	**413**	**498**	**10,911**	**19,496**	**64,540**	**64,455**	**54,042**	**45,457**
18	A	70,850	1,221	1,221	16,803	18,105	69,629	69,629	54,047	52,745
18	B	48,002	1,001	1,001	10,844	12,767	47,001	47,001	37,158	35,235
18	C	25,227	1,197	4,181	4,341	5,583	24,030	21,046	20,886	19,644
18	D	23,754	0	0	0	5,584	23,754	23,754	23,754	18,170
18	**Total**	**167,833**	**3,419**	**6,403**	**31,988**	**42,039**	**164,414**	**161,430**	**135,845**	**125,794**
19	A	119,962	0	0	0	0	119,962	119,962	119,962	119,962
19	B	64,347	0	0	0	0	64,347	64,347	64,347	64,347
19	C	10,677	0	0	0	0	10,677	10,677	10,677	10,677
19	D	3,219	0	0	0	0	3,219	3,219	3,219	3,219
19	**Total**	**198,205**	**0**	**0**	**0**	**0**	**198,205**	**198,205**	**198,205**	**198,205**
20	A	200,773	0	0	0	0	200,773	200,773	200,773	200,773
20	B	96,887	0	0	0	0	96,887	96,887	96,887	96,887
20	C	11,365	0	0	0	0	11,365	11,365	11,365	11,365
20	D	2,640	0	0	0	0	2,640	2,640	2,640	2,640
20	**Total**	**311,665**	**0**	**0**	**0**	**0**	**311,665**	**311,665**	**311,665**	**311,665**
21	A	76,404	0	0	0	0	76,404	76,404	76,404	76,404
21	B	32,779	0	0	0	0	32,779	32,779	32,779	32,779
21	C	5,099	0	0	0	0	5,099	5,099	5,099	5,099
21	D	520	0	0	0	0	520	520	520	520
21	**Total**	**114,802**	**0**	**0**	**0**	**0**	**114,802**	**114,802**	**114,802**	**114,802**

[1] Strata Class: A = 8 - 19,000 board feet/acre
B = 20 - 29,000 board feet/acre
C = 30 - 49,000 board feet/acre
D = 50,000+ board feet/acre

Table 3-64

Change in Old Growth acreage over 150 years within each of 21 Ecological Provinces, for Alternative B

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
1	A	12,317	0	0	1,558	1,558	12,317	12,317	10,759	10,759
1	B	10,860	0	767	3,416	3,416	10,860	10,093	7,444	7,444
1	C	22,895	1,356	4,867	4,867	8,065	21,539	18,028	18,028	14,830
1	D	3,065	0	0	0	0	3,065	3,065	3,065	3,065
1	**Total**	**49,137**	**1,356**	**5,634**	**9,841**	**13,039**	**47,781**	**43,503**	**39,296**	**36,098**
2	A	12,849	0	0	0	0	12,849	12,849	12,849	12,849
2	B	9,868	0	0	0	0	9,868	9,868	9,868	9,868
2	C	2,020	0	0	0	0	2,020	2,020	2,020	2,020
2	D	0	0	0	0	0	0	0	0	0
2	**Total**	**24,737**	**0**	**0**	**0**	**0**	**24,737**	**24,737**	**24,737**	**24,737**
3	A	219,723	0	240	23,513	46,723	219,723	219,483	196,210	173,000
3	B	154,005	13,596	25,484	36,403	42,033	140,409	128,521	117,602	111,972
3	C	34,036	869	2,264	3,329	7,997	33,167	31,772	30,707	26,039
3	D	720	6	121	121	178	714	599	599	542
3	**Total**	**408,484**	**14,471**	**28,109**	**63,366**	**96,931**	**394,013**	**380,375**	**345,118**	**311,553**
4	A	49,788	0	0	0	0	49,788	49,788	49,788	49,788
4	B	17,525	0	0	0	0	17,525	17,525	17,525	17,525
4	C	2,159	0	0	0	0	2,159	2,159	2,159	2,159
4	D	0	0	0	0	0	0	0	0	0
4	**Total**	**69,472**	**0**	**0**	**0**	**0**	**69,472**	**69,472**	**69,472**	**69,472**
5	A	58,336	0	0	2,480	2,480	58,336	58,336	55,856	55,856
5	B	34,747	4,966	4,983	9,689	10,510	29,781	29,764	25,058	24,237
5	C	2,204	140	140	580	580	2,064	2,064	1,624	1,624
5	D	0	0	0	0	0	0	0	0	0
5	**Total**	**95,287**	**5,106**	**5,123**	**12,749**	**13,570**	**90,181**	**90,164**	**82,538**	**81,717**
6	A	152,078	0	0	4,123	4,864	152,078	152,078	147,955	147,214
6	B	60,018	1,423	1,423	3,501	3,541	58,595	58,595	56,517	56,477
6	C	4,186	20	20	208	300	4,166	4,166	3,978	3,886
6	D	60	0	0	0	0	60	60	60	60
6	**Total**	**216,342**	**1,443**	**1,443**	**7,832**	**8,705**	**214,899**	**214,899**	**208,510**	**207,637**
7	A	243,269	0	0	559	4,709	243,269	243,269	242,710	238,560
7	B	245,348	1,263	1,263	1,263	2,205	244,085	244,085	244,085	243,143
7	C	90,981	0	561	561	561	90,981	90,420	90,420	90,420
7	D	7,195	20	20	20	20	7,175	7,175	7,175	7,175
7	**Total**	**586,793**	**1,283**	**1,844**	**2,403**	**7,495**	**585,510**	**584,949**	**584,390**	**579,298**
8	A	84,718	0	0	3,599	3,719	84,718	84,718	81,119	80,999
8	B	56,384	160	780	7,800	14,552	56,224	55,604	48,584	41,832
8	C	11,575	0	1,260	1,440	3,438	11,575	10,315	10,135	8,137
8	D	240	0	0	0	0	240	240	240	240
8	**Total**	**152,917**	**160**	**2,040**	**12,839**	**21,709**	**152,757**	**150,877**	**140,078**	**131,208**

Table 3-64 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
9	A	159,978	0	0	3,880	18,669	159,978	159,978	156,098	141,309
9	B	138,950	682	682	17,184	19,357	138,268	138,268	121,766	119,593
9	C	22,602	0	2,473	2,751	4,029	22,602	20,129	19,851	18,573
9	D	415	0	115	115	115	415	300	300	300
9	**Total**	**321,945**	**682**	**3,270**	**23,930**	**42,170**	**321,263**	**318,675**	**298,015**	**279,775**
10	A	183,583	0	5,165	31,763	74,730	183,583	178,418	151,820	108,853
10	B	110,058	3,753	9,842	33,945	47,592	106,305	100,216	76,113	62,466
10	C	18,385	4,822	4,822	7,386	8,407	13,563	13,563	10,999	9,978
10	D	1,420	0	0	0	100	1,420	1,420	1,420	1,320
10	**Total**	**313,446**	**8,575**	**19,829**	**73,094**	**130,829**	**304,871**	**293,617**	**240,352**	**182,617**
11	A	102,758	0	125	11,980	29,884	102,758	102,633	90,778	72,874
11	B	157,389	8,066	17,445	35,188	40,190	149,323	139,944	122,201	117,199
11	C	31,373	2,688	5,314	10,940	12,104	28,685	26,059	20,433	19,269
11	D	5,802	0	0	0	3,999	5,802	5,802	5,802	1,803
11	**Total**	**297,322**	**10,754**	**22,884**	**58,108**	**86,177**	**286,568**	**274,438**	**239,214**	**211,145**
12	A	127,224	1,914	4,525	11,019	25,236	125,310	122,699	116,205	101,988
12	B	96,408	382	862	14,143	18,816	96,026	95,546	82,265	77,592
12	C	17,934	3,100	3,100	3,378	3,678	14,834	14,834	14,556	14,256
12	D	481	0	0	0	200	481	481	481	281
12	**Total**	**242,047**	**5,396**	**8,487**	**28,540**	**47,930**	**236,651**	**233,560**	**213,507**	**194,117**
13	A	130,289	12,074	21,427	37,877	52,316	118,215	108,862	92,412	77,973
13	B	85,153	3,805	13,700	25,598	33,920	81,348	71,453	59,555	51,233
13	C	12,020	4,160	4,440	5,460	5,460	7,860	7,580	6,560	6,560
13	D	661	0	0	0	160	661	661	661	501
13	**Total**	**228,123**	**20,039**	**39,567**	**68,935**	**91,856**	**208,084**	**188,556**	**159,188**	**136,267**
14	A	208,083	12,249	13,131	87,787	96,915	195,834	194,952	120,296	111,168
14	B	213,364	12,017	32,724	81,816	101,224	201,347	180,640	131,548	112,140
14	C	93,072	6,828	32,238	38,788	45,570	86,244	60,834	54,284	47,502
14	D	33,071	6,285	9,110	10,530	18,624	26,786	23,961	22,541	14,447
14	**Total**	**547,590**	**37,379**	**87,203**	**218,921**	**262,333**	**510,211**	**460,387**	**328,669**	**285,257**
15	A	221,939	893	986	9,001	51,873	221,046	220,953	212,938	170,066
15	B	267,613	9,484	13,685	26,097	69,393	258,129	253,928	241,516	198,220
15	C	32,368	914	1,880	8,299	9,339	31,454	30,488	24,069	23,029
15	D	1,780	0	0	0	300	1,780	1,780	1,780	1,480
15	**Total**	**523,700**	**11,291**	**16,551**	**43,397**	**130,905**	**512,409**	**507,149**	**480,303**	**392,795**
16	A	56,957	1,833	1,833	7,827	8,803	55,124	55,124	49,130	48,154
16	B	45,602	5,439	5,439	10,230	10,609	40,163	40,163	35,372	34,993
16	C	11,279	2,905	3,055	4,532	4,532	8,374	8,224	6,747	6,747
16	D	2,124	95	95	95	1,423	2,029	2,029	2,029	701
16	**Total**	**115,962**	**10,272**	**10,422**	**22,684**	**25,367**	**105,690**	**105,540**	**93,278**	**90,595**

Table 3-64 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
17	A	27,552	239	239	540	899	27,313	27,313	27,012	26,653
17	B	29,078	80	80	575	1,276	28,998	28,998	28,503	27,802
17	C	6,747	43	99	237	596	6,704	6,648	6,510	6,151
17	D	1,576	0	0	0	458	1,576	1,576	1,576	1,118
17	**Total**	**64,953**	**362**	**418**	**1,352**	**3,229**	**64,591**	**64,535**	**63,601**	**61,724**
18	A	70,850	754	1,200	20,634	24,395	70,096	69,650	50,216	46,455
18	B	48,002	1,001	1,001	13,546	17,107	47,001	47,001	34,456	30,895
18	C	25,227	850	5,383	5,543	7,644	24,377	19,844	19,684	17,583
18	D	23,754	0	0	0	6,607	23,754	23,754	23,754	17,147
18	**Total**	**167,833**	**2,605**	**7,584**	**39,723**	**55,753**	**165,228**	**160,249**	**128,110**	**112,080**
19	A	119,962	0	0	0	0	119,962	119,962	119,962	119,962
19	B	64,347	0	0	0	0	64,347	64,347	64,347	64,347
19	C	10,677	0	0	0	0	10,677	10,677	10,677	10,677
19	D	3,219	0	0	0	0	3,219	3,219	3,219	3,219
19	**Total**	**198,205**	**0**	**0**	**0**	**0**	**198,205**	**198,205**	**198,205**	**198,205**
20	A	200,773	0	0	0	0	200,773	200,773	200,773	200,773
20	B	96,887	0	0	0	0	96,887	96,887	96,887	96,887
20	C	11,365	0	0	0	0	11,365	11,365	11,365	11,365
20	D	2,640	0	0	0	0	2,640	2,640	2,640	2,640
20	**Total**	**311,665**	**0**	**0**	**0**	**0**	**311,665**	**311,665**	**311,665**	**311,665**
21	A	76,404	0	0	0	0	76,404	76,404	76,404	76,404
21	B	32,779	0	0	0	0	32,779	32,779	32,779	32,779
21	C	5,099	0	0	0	0	5,099	5,099	5,099	5,099
21	D	520	0	0	0	0	520	520	520	520
21	**Total**	**114,802**	**0**	**0**	**0**	**0**	**114,802**	**114,802**	**114,802**	**114,802**

[1] Strata Class: A = 8 - 19,000 board feet/acre
B = 20 - 29,000 board feet/acre
C = 30 - 49,000 board feet/acre
D = 50,000+ board feet/acre

Table 3-65

Change in Old Growth acreage over 150 years within each of 21 Ecological Provinces, for Alternative C

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
1	A	12,317	0	0	0	4,257	12,317	12,317	12,317	8,060
1	B	10,860	0	0	2,933	9,008	10,860	10,860	7,927	1,852
1	C	22,895	14	946	946	13,450	22,881	21,949	21,949	9,445
1	D	3,065	0	0	0	0	3,065	3,065	3,065	3,065
1	**Total**	**49,137**	**14**	**946**	**3,879**	**26,715**	**49,123**	**48,191**	**45,258**	**22,422**
2	A	12,849	0	0	0	0	12,849	12,849	12,849	12,849
2	B	9,868	0	0	0	0	9,868	9,868	9,868	9,868
2	C	2,020	0	0	0	0	2,020	2,020	2,020	2,020
2	D	0	0	0	0	0	0	0	0	0
2	**Total**	**24,737**	**0**	**0**	**0**	**0**	**24,737**	**24,737**	**24,737**	**24,737**
3	A	219,723	0	1,562	26,323	41,786	219,723	218,161	193,400	177,937
3	B	154,005	15,507	34,515	38,975	51,766	138,498	119,490	115,030	102,239
3	C	34,036	928	2,958	7,503	10,402	33,108	31,078	26,533	23,634
3	D	720	6	302	302	338	714	418	418	382
3	**Total**	**408,484**	**16,441**	**39,337**	**73,103**	**104,292**	**392,043**	**369,147**	**335,381**	**304,192**
4	A	49,788	0	0	0	0	49,788	49,788	49,788	49,788
4	B	17,525	0	0	0	80	17,525	17,525	17,525	17,445
4	C	2,159	0	0	0	0	2,159	2,159	2,159	2,159
4	D	0	0	0	0	0	0	0	0	0
4	**Total**	**69,472**	**0**	**0**	**0**	**80**	**69,472**	**69,472**	**69,472**	**69,392**
5	A	58,336	0	0	2,652	5,334	58,336	58,336	55,684	53,002
5	B	34,747	10,908	11,918	12,824	12,983	23,839	22,829	21,923	21,764
5	C	2,204	233	262	559	559	1,971	1,942	1,645	1,645
5	D	0	0	0	0	0	0	0	0	0
5	**Total**	**95,287**	**11,141**	**12,180**	**16,035**	**18,876**	**84,146**	**83,107**	**79,252**	**76,411**
6	A	152,078	23	4,120	4,120	6,043	152,055	147,958	147,958	146,035
6	B	60,018	726	2,562	5,053	5,053	59,292	57,456	54,965	54,965
6	C	4,186	12	90	570	633	4,174	4,096	3,616	3,553
6	D	60	0	0	0	0	60	60	60	60
6	**Total**	**216,342**	**761**	**6,772**	**9,743**	**11,729**	**215,581**	**209,570**	**206,599**	**204,613**
7	A	243,269	0	0	9,746	12,330	243,269	243,269	233,523	230,939
7	B	245,348	0	0	2,924	8,906	245,348	245,348	242,424	236,442
7	C	90,981	0	640	1,180	2,320	90,981	90,341	89,801	88,661
7	D	7,195	140	140	140	140	7,055	7,055	7,055	7,055
7	**Total**	**586,793**	**140**	**780**	**13,990**	**23,696**	**586,653**	**586,013**	**572,803**	**563,097**
8	A	84,718	0	0	5,134	7,534	84,718	84,718	79,584	77,184
8	B	56,384	0	0	11,107	16,829	56,384	56,384	45,277	39,555
8	C	11,575	120	120	600	3,459	11,455	11,455	10,975	8,116
8	D	240	0	0	0	0	240	240	240	240
8	**Total**	**152,917**	**120**	**120**	**16,841**	**27,822**	**152,797**	**152,797**	**136,076**	**125,095**

Table 3-65 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
9	A	159,978	0	0	5,545	9,060	159,978	159,978	154,433	150,918
9	B	138,950	0	0	31,090	36,084	138,950	138,950	107,860	102,866
9	C	22,602	3,192	4,575	4,759	7,091	19,410	18,027	17,843	15,511
9	D	415	0	195	195	195	415	220	220	220
9	**Total**	**321,945**	**3,192**	**4,770**	**41,589**	**52,430**	**318,753**	**317,175**	**280,356**	**269,515**
10	A	183,583	1,238	5,743	28,392	79,422	182,345	177,840	155,191	104,161
10	B	110,058	6,380	12,581	39,113	53,053	103,678	97,477	70,945	57,005
10	C	18,385	2,020	4,662	8,264	9,385	16,365	13,723	10,121	9,000
10	D	1,420	0	0	0	260	1,420	1,420	1,420	1,160
10	**Total**	**313,446**	**9,638**	**22,986**	**75,769**	**142,120**	**303,808**	**290,460**	**237,677**	**171,326**
11	A	102,758	0	2,039	13,654	36,636	102,758	100,719	89,104	66,122
11	B	157,389	14,481	19,822	41,019	47,373	142,908	137,567	116,370	110,016
11	C	31,373	4,267	6,371	12,739	14,323	27,106	25,002	18,634	17,050
11	D	5,802	0	336	336	4,219	5,802	5,466	5,466	1,583
11	**Total**	**297,322**	**18,748**	**28,568**	**67,748**	**102,551**	**278,574**	**268,754**	**229,574**	**194,771**
12	A	127,224	40	780	8,940	35,037	127,184	126,444	118,284	92,187
12	B	96,408	9	529	18,498	25,758	96,399	95,879	77,910	70,650
12	C	17,934	3,703	3,761	4,199	4,870	14,231	14,173	13,735	13,064
12	D	481	0	120	120	260	481	361	361	221
12	**Total**	**242,047**	**3,752**	**5,190**	**31,757**	**65,925**	**238,295**	**236,857**	**210,290**	**176,122**
13	A	130,289	9,326	23,129	45,607	62,586	120,963	107,160	84,682	67,703
13	B	85,153	6,436	19,782	33,750	43,061	78,717	65,371	51,403	42,092
13	C	12,020	3,580	5,180	7,020	7,020	8,440	6,840	5,000	5,000
13	D	661	0	180	180	180	661	481	481	481
13	**Total**	**228,123**	**19,342**	**48,271**	**86,557**	**112,847**	**208,781**	**179,852**	**141,566**	**115,276**
14	A	208,083	14,094	16,074	98,630	122,983	193,989	192,009	109,453	85,100
14	B	213,364	21,843	33,251	104,505	125,170	191,521	180,113	108,859	88,194
14	C	93,072	7,678	48,044	48,421	57,505	85,394	45,028	44,651	35,567
14	D	33,071	10,277	16,416	16,584	24,667	22,794	16,655	16,487	8,404
14	**Total**	**547,590**	**53,892**	**113,785**	**268,140**	**330,325**	**493,698**	**433,805**	**279,450**	**217,265**
15	A	221,939	947	7,086	9,745	74,755	220,992	214,853	212,194	147,184
15	B	267,613	13,477	14,037	38,875	102,082	254,136	253,576	228,738	165,531
15	C	32,368	899	2,001	10,561	12,201	31,469	30,367	21,807	20,167
15	D	1,780	0	0	0	700	1,780	1,780	1,780	1,080
15	**Total**	**523,700**	**15,323**	**23,124**	**59,181**	**189,738**	**508,377**	**500,576**	**464,519**	**333,962**
16	A	56,957	1,670	3,350	11,674	14,118	55,287	53,607	45,283	42,839
16	B	45,602	5,801	5,801	12,977	14,347	39,801	39,801	32,625	31,255
16	C	11,279	3,244	5,264	5,273	5,273	8,035	6,015	6,006	6,006
16	D	2,124	0	0	0	1,504	2,124	2,124	2,124	620
16	**Total**	**115,962**	**10,715**	**14,415**	**29,924**	**35,242**	**105,247**	**101,547**	**86,038**	**80,720**

Table 3-65 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
17	A	27,552	299	299	9,618	14,443	27,253	27,253	17,934	13,109
17	B	29,078	434	434	10,669	16,322	28,644	28,644	18,409	12,756
17	C	6,747	0	3,314	3,314	4,631	6,747	3,433	3,433	2,116
17	D	1,576	0	0	0	1,077	1,576	1,576	1,576	499
17	**Total**	**64,953**	**733**	**4,047**	**23,601**	**36,473**	**64,220**	**60,906**	**41,352**	**28,480**
18	A	70,850	1,241	1,241	36,260	40,283	69,609	69,609	34,590	30,567
18	B	48,002	1,021	5,061	23,004	27,927	46,981	42,941	24,998	20,075
18	C	25,227	761	9,498	9,658	13,202	24,466	15,729	15,569	12,025
18	D	23,754	444	1,183	1,183	9,265	23,310	22,571	22,571	14,489
18	**Total**	**167,833**	**3,467**	**16,983**	**70,105**	**90,677**	**164,366**	**150,850**	**97,728**	**77,156**
19	A	119,962	274	274	3,094	3,399	119,688	119,688	116,868	116,563
19	B	64,347	818	818	998	2,079	63,529	63,529	63,349	62,268
19	C	10,677	0	300	660	760	10,677	10,377	10,017	9,917
19	D	3,219	0	60	60	140	3,219	3,159	3,159	3,079
19	**Total**	**198,205**	**1,092**	**1,452**	**4,812**	**6,378**	**197,113**	**196,753**	**193,393**	**191,827**
20	A	200,773	0	0	0	0	200,773	200,773	200,773	200,773
20	B	96,887	0	0	0	0	96,887	96,887	96,887	96,887
20	C	11,365	0	0	0	0	11,365	11,365	11,365	11,365
20	D	2,640	0	0	0	0	2,640	2,640	2,640	2,640
20	**Total**	**311,665**	**0**	**0**	**0**	**0**	**311,665**	**311,665**	**311,665**	**311,665**
21	A	76,404	478	478	3,714	4,792	75,926	75,926	72,690	71,612
21	B	32,779	0	239	1,038	1,857	32,779	32,540	31,741	30,922
21	C	5,099	0	0	159	159	5,099	5,099	4,940	4,940
21	D	520	0	0	0	0	520	520	520	520
21	**Total**	**114,802**	**478**	**717**	**4,911**	**6,808**	**114,324**	**114,085**	**109,891**	**107,994**

[1] Strata Class: A = 8 - 19,000 board feet/acre
B = 20 - 29,000 board feet/acre
C = 30 - 49,000 board feet/acre
D = 50,000+ board feet/acre

Table 3-66

Change in Old Growth acreage over 150 years within each of 21 Ecological Provinces, for Alternative D

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
1	A	12,317	0	0	3,558	3,558	12,317	12,317	8,759	8,759
1	B	10,860	0	0	3,761	5,701	10,860	10,860	7,099	5,159
1	C	22,895	6,779	7,120	7,120	13,116	16,116	15,775	15,775	9,779
1	D	3,065	0	60	60	60	3,065	3,005	3,005	3,005
1	**Total**	**49,137**	**6,779**	**7,180**	**14,499**	**22,435**	**42,358**	**41,957**	**34,638**	**26,702**
2	A	12,849	0	0	0	0	12,849	12,849	12,849	12,849
2	B	9,868	0	0	0	0	9,868	9,868	9,868	9,868
2	C	2,020	0	0	0	0	2,020	2,020	2,020	2,020
2	D	0	0	0	0	0	0	0	0	0
2	**Total**	**24,737**	**0**	**0**	**0**	**0**	**24,737**	**24,737**	**24,737**	**24,737**
3	A	219,723	0	0	33,477	67,665	219,723	219,723	186,246	152,058
3	B	154,005	15,729	31,014	46,184	58,566	138,276	122,991	107,821	95,439
3	C	34,036	2,027	4,092	6,067	10,019	32,009	29,944	27,969	24,017
3	D	720	0	360	360	360	720	360	360	360
3	**Total**	**408,484**	**17,756**	**35,466**	**86,088**	**136,610**	**390,728**	**373,018**	**322,396**	**271,874**
4	A	49,788	0	0	0	0	49,788	49,788	49,788	49,788
4	B	17,525	0	0	40	40	17,525	17,525	17,485	17,485
4	C	2,159	0	0	0	0	2,159	2,159	2,159	2,159
4	D	0	0	0	0	0	0	0	0	0
4	**Total**	**69,472**	**0**	**0**	**40**	**40**	**69,472**	**69,472**	**69,432**	**69,432**
5	A	58,336	0	0	200	3,263	58,336	58,336	58,136	55,073
5	B	34,747	1,807	4,503	15,409	16,330	32,940	30,244	19,338	18,417
5	C	2,204	55	117	559	559	2,149	2,087	1,645	1,645
5	D	0	0	0	0	0	0	0	0	0
5	**Total**	**95,287**	**1,862**	**4,620**	**16,168**	**20,152**	**93,425**	**90,667**	**79,119**	**75,135**
6	A	152,078	0	0	500	5,546	152,078	152,078	151,578	146,532
6	B	60,018	1,828	2,021	2,560	2,800	58,190	57,997	57,458	57,218
6	C	4,186	26	27	431	500	4,160	4,159	3,755	3,686
6	D	60	0	0	0	0	60	60	60	60
6	**Total**	**216,342**	**1,854**	**2,048**	**3,491**	**8,846**	**214,488**	**214,294**	**212,851**	**207,496**
7	A	243,269	0	0	3,019	7,539	243,269	243,269	240,250	235,730
7	B	245,348	1,034	3,582	4,722	7,605	244,314	241,766	240,626	237,743
7	C	90,981	0	1,540	1,640	1,640	90,981	89,441	89,341	89,341
7	D	7,195	40	40	40	40	7,155	7,155	7,155	7,155
7	**Total**	**586,793**	**1,074**	**5,162**	**9,421**	**16,824**	**585,719**	**581,631**	**577,372**	**569,969**
8	A	84,718	721	721	4,479	4,818	83,997	83,997	80,239	79,900
8	B	56,384	783	1,461	16,217	16,838	55,601	54,923	40,167	39,546
8	C	11,575	758	1,859	2,039	3,938	10,817	9,716	9,536	7,637
8	D	240	0	0	0	0	240	240	240	240
8	**Total**	**152,917**	**2,262**	**4,041**	**22,735**	**25,594**	**150,655**	**148,876**	**130,182**	**127,323**

Table 3-66 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
9	A	159,978	0	0	8,844	27,430	159,978	159,978	151,134	132,548
9	B	138,950	100	100	11,909	23,089	138,850	138,850	127,041	115,861
9	C	22,602	0	4,311	4,629	6,641	22,602	18,291	17,973	15,961
9	D	415	0	115	115	115	415	300	300	300
9	**Total**	**321,945**	**100**	**4,526**	**25,497**	**57,275**	**321,845**	**317,419**	**296,448**	**264,670**
10	A	183,583	457	6,241	33,206	87,137	183,126	177,342	150,377	96,446
10	B	110,058	6,540	13,937	42,553	60,263	103,518	96,121	67,505	49,795
10	C	18,385	2,482	3,783	8,944	10,464	15,903	14,602	9,441	7,921
10	D	1,420	0	0	0	219	1,420	1,420	1,420	1,201
10	**Total**	**313,446**	**9,479**	**23,961**	**84,703**	**158,083**	**303,967**	**289,485**	**228,743**	**155,363**
11	A	102,758	0	0	16,459	42,255	102,758	102,758	86,299	60,503
11	B	157,389	17,471	25,821	53,945	64,850	139,918	131,568	103,444	92,539
11	C	31,373	4,650	6,196	14,280	15,758	26,723	25,177	17,093	15,615
11	D	5,802	0	268	268	4,039	5,802	5,534	5,534	1,763
11	**Total**	**297,322**	**22,121**	**32,285**	**84,952**	**126,902**	**275,201**	**265,037**	**212,370**	**170,420**
12	A	127,224	0	780	8,810	31,987	127,224	126,444	118,414	95,237
12	B	96,408	0	660	20,182	26,499	96,408	95,748	76,226	69,909
12	C	17,934	3,582	3,582	4,503	4,503	14,352	14,352	13,431	13,431
12	D	481	0	120	120	199	481	361	361	282
12	**Total**	**242,047**	**3,582**	**5,142**	**33,615**	**63,188**	**238,465**	**236,905**	**208,432**	**178,859**
13	A	130,289	10,443	25,285	45,781	67,150	119,846	105,004	84,508	63,139
13	B	85,153	6,922	23,390	33,951	45,948	78,231	61,763	51,202	39,205
13	C	12,020	4,223	5,896	6,879	6,879	7,797	6,124	5,141	5,141
13	D	661	0	180	180	180	661	481	481	481
13	**Total**	**228,123**	**21,588**	**54,751**	**86,791**	**120,157**	**206,535**	**173,372**	**141,332**	**107,966**
14	A	208,083	6,142	13,231	102,890	123,498	201,941	194,852	105,193	84,585
14	B	213,364	24,754	25,318	111,724	131,640	188,610	188,046	101,640	81,724
14	C	93,072	6,516	43,897	48,063	56,122	86,556	49,175	45,009	36,950
14	D	33,071	7,748	15,186	15,186	24,164	25,323	17,885	17,885	8,907
14	**Total**	**547,590**	**45,160**	**97,632**	**277,863**	**335,424**	**502,430**	**449,958**	**269,727**	**212,166**
15	A	221,939	1,039	8,663	12,162	65,853	220,900	213,276	209,777	156,086
15	B	267,613	14,007	17,249	20,812	88,833	253,606	250,364	246,801	178,780
15	C	32,368	1,174	2,300	9,439	10,599	31,194	30,068	22,929	21,769
15	D	1,780	0	0	0	380	1,780	1,780	1,780	1,400
15	**Total**	**523,700**	**16,220**	**28,212**	**42,413**	**165,665**	**507,480**	**495,488**	**481,287**	**358,035**
16	A	56,957	287	4,193	9,549	15,320	56,670	52,764	47,408	41,637
16	B	45,602	7,264	7,264	15,364	16,855	38,338	38,338	30,238	28,747
16	C	11,279	3,110	6,254	6,254	6,254	8,169	5,025	5,025	5,025
16	D	2,124	0	0	0	1,706	2,124	2,124	2,124	418
16	**Total**	**115,962**	**10,661**	**17,711**	**31,167**	**40,135**	**105,301**	**98,251**	**84,795**	**75,827**

Table 3-66 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
17	A	27,552	319	319	2,507	14,195	27,233	27,233	25,045	13,357
17	B	29,078	1,734	1,734	11,877	17,872	27,344	27,344	17,201	11,206
17	C	6,747	0	2,934	2,934	4,432	6,747	3,813	3,813	2,315
17	D	1,576	0	0	0	1,077	1,576	1,576	1,576	499
17	**Total**	**64,953**	**2,053**	**4,987**	**17,318**	**37,576**	**62,900**	**59,966**	**47,635**	**27,377**
18	A	70,850	1,881	1,929	47,110	52,393	68,969	68,921	23,740	18,457
18	B	48,002	3,659	9,380	28,552	34,658	44,343	38,622	19,450	13,344
18	C	25,227	2,057	11,997	12,157	15,261	23,170	13,230	13,070	9,966
18	D	23,754	581	1,656	1,961	10,442	23,173	22,098	21,793	13,312
18	**Total**	**167,833**	**8,178**	**24,962**	**89,780**	**112,754**	**159,655**	**142,871**	**78,053**	**55,079**
19	A	119,962	526	526	1,896	1,896	119,436	119,436	118,066	118,066
19	B	64,347	760	760	900	1,680	63,587	63,587	63,447	62,667
19	C	10,677	0	80	534	579	10,677	10,597	10,143	10,098
19	D	3,219	0	0	0	160	3,219	3,219	3,219	3,059
19	**Total**	**198,205**	**1,286**	**1,366**	**3,330**	**4,315**	**196,919**	**196,839**	**194,875**	**193,890**
20	A	200,773	0	0	0	0	200,773	200,773	200,773	200,773
20	B	96,887	0	0	0	0	96,887	96,887	96,887	96,887
20	C	11,365	0	0	0	0	11,365	11,365	11,365	11,365
20	D	2,640	0	0	0	0	2,640	2,640	2,640	2,640
20	**Total**	**311,665**	**0**	**0**	**0**	**0**	**311,665**	**311,665**	**311,665**	**311,665**
21	A	76,404	220	220	2,239	2,939	76,184	76,184	74,165	73,465
21	B	32,779	0	120	420	1,019	32,779	32,659	32,359	31,760
21	C	5,099	100	100	100	100	4,999	4,999	4,999	4,999
21	D	520	0	0	0	0	520	520	520	520
21	**Total**	**114,802**	**320**	**440**	**2,759**	**4,058**	**114,482**	**114,362**	**112,043**	**110,744**

[1] Strata Class: A = 8 - 19,000 board feet/acre
B = 20 - 29,000 board feet/acre
C = 30 - 49,000 board feet/acre
D = 50,000+ board feet/acre

Table 3-67

Change in Old Growth Acreage over 150 years within each of 21 Ecological Provinces, for Alternative P

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
1	A	12,317	0	0	160	3,658	12,317	12,317	12,157	8,659
1	B	10,860	0	0	2,415	8,725	10,860	10,860	8,445	2,135
1	C	22,895	0	0	498	10,364	22,895	22,895	22,397	12,531
1	D	3,065	0	0	0	0	3,065	3,065	3,065	3,065
1	**Total**	**49,137**	**0**	**0**	**3,073**	**22,747**	**49,137**	**49,137**	**46,064**	**26,390**
2	A	12,849	0	0	0	0	12,849	12,849	12,849	12,849
2	B	9,868	0	0	0	0	9,868	9,868	9,868	9,868
2	C	2,020	0	0	0	0	2,020	2,020	2,020	2,020
2	D	0	0	0	0	0	0	0	0	0
2	**Total**	**24,737**	**0**	**0**	**0**	**0**	**24,737**	**24,737**	**24,737**	**24,737**
3	A	219,723	0	0	7,450	27,055	219,723	219,723	212,273	192,668
3	B	154,005	17,055	33,713	52,993	59,232	136,950	120,292	101,012	94,773
3	C	34,036	1,427	2,649	6,872	9,878	32,609	31,387	27,164	24,158
3	D	720	179	300	300	319	541	420	420	401
3	**Total**	**408,484**	**18,661**	**36,662**	**67,615**	**96,484**	**389,823**	**371,822**	**340,869**	**312,000**
4	A	49,788	0	0	0	0	49,788	49,788	49,788	49,788
4	B	17,525	0	0	0	0	17,525	17,525	17,525	17,525
4	C	2,159	0	0	0	0	2,159	2,159	2,159	2,159
4	D	0	0	0	0	0	0	0	0	0
4	**Total**	**69,472**	**0**	**0**	**0**	**0**	**69,472**	**69,472**	**69,472**	**69,472**
5	A	58,336	0	0	431	3,014	58,336	58,336	57,905	55,322
5	B	34,747	3,389	7,741	11,109	11,289	31,358	27,006	23,638	23,458
5	C	2,204	87	198	579	579	2,117	2,006	1,625	1,625
5	D	0	0	0	0	0	0	0	0	0
5	**Total**	**95,287**	**3,476**	**7,939**	**12,119**	**14,882**	**91,811**	**87,348**	**83,168**	**80,405**
6	A	152,078	0	29	29	5,203	152,078	152,049	152,049	146,875
6	B	60,018	1,081	1,787	2,802	2,942	58,937	58,231	57,216	57,076
6	C	4,186	10	17	109	209	4,176	4,169	4,077	3,977
6	D	60	0	0	0	0	60	60	60	60
6	**Total**	**216,342**	**1,091**	**1,833**	**2,940**	**8,354**	**215,251**	**214,509**	**213,402**	**207,988**
7	A	243,269	0	0	2,159	4,678	243,269	243,269	241,110	238,591
7	B	245,348	0	0	1,981	7,320	245,348	245,348	243,367	238,028
7	C	90,981	0	0	540	2,020	90,981	90,981	90,441	88,961
7	D	7,195	0	0	140	140	7,195	7,195	7,055	7,055
7	**Total**	**586,793**	**0**	**0**	**4,820**	**14,158**	**586,793**	**586,793**	**581,973**	**572,635**
8	A	84,718	720	720	5,915	7,975	83,998	83,998	78,803	76,743
8	B	56,384	265	1,171	11,068	16,550	56,119	55,213	45,316	39,834
8	C	11,575	109	209	3,607	3,996	11,466	11,366	7,968	7,579
8	D	240	0	0	0	0	240	240	240	240
8	**Total**	**152,917**	**1,094**	**2,100**	**20,590**	**28,521**	**151,823**	**150,817**	**132,327**	**124,396**

Table 3-67 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
9	A	159,978	0	0	8,080	8,986	159,978	159,978	151,898	150,992
9	B	138,950	4,918	9,800	31,534	35,802	134,032	129,150	107,416	103,148
9	C	22,602	537	871	2,753	6,986	22,065	21,731	19,849	15,616
9	D	415	0	195	195	195	415	220	220	220
9	**Total**	**321,945**	**5,455**	**10,866**	**42,562**	**51,969**	**316,490**	**311,079**	**279,383**	**269,976**
10	A	183,583	276	5,742	28,383	77,339	183,307	177,841	155,200	106,244
10	B	110,058	6,583	13,475	38,958	51,793	103,475	96,583	71,100	58,265
10	C	18,385	2,495	4,320	7,904	8,985	15,890	14,065	10,481	9,400
10	D	1,420	0	0	0	260	1,420	1,420	1,420	1,160
10	**Total**	**313,446**	**9,354**	**23,537**	**75,245**	**138,377**	**304,092**	**289,909**	**238,201**	**175,069**
11	A	102,758	0	3,939	10,208	19,043	102,758	98,819	92,550	83,715
11	B	157,389	14,884	19,221	32,711	36,665	142,505	138,168	124,678	120,724
11	C	31,373	4,312	6,304	9,636	11,118	27,061	25,069	21,737	20,255
11	D	5,802	0	70	70	3,920	5,802	5,732	5,732	1,882
11	**Total**	**297,322**	**19,196**	**29,534**	**52,625**	**70,746**	**278,126**	**267,788**	**244,697**	**226,576**
12	A	127,224	740	740	7,318	36,953	126,484	126,484	119,906	90,271
12	B	96,408	2,363	3,001	20,877	28,359	94,045	93,407	75,531	68,049
12	C	17,934	2,723	3,761	4,642	5,414	15,211	14,173	13,292	12,520
12	D	481	0	120	120	260	481	361	361	221
12	**Total**	**242,047**	**5,826**	**7,622**	**32,957**	**70,986**	**236,221**	**234,425**	**209,090**	**171,061**
13	A	130,289	9,513	20,520	41,455	62,101	120,776	109,769	88,834	68,188
13	B	85,153	810	11,868	33,823	42,280	84,343	73,285	51,330	42,873
13	C	12,020	3,113	5,139	6,979	6,979	8,907	6,881	5,041	5,041
13	D	661	0	180	180	180	661	481	481	481
13	**Total**	**228,123**	**13,436**	**37,707**	**82,437**	**111,540**	**214,687**	**190,416**	**145,686**	**116,583**
14	A	208,083	10,368	13,756	105,188	120,699	197,715	194,327	102,895	87,384
14	B	213,364	32,479	33,958	103,342	122,304	180,885	179,406	110,022	91,060
14	C	93,072	7,832	46,195	46,215	54,895	85,240	46,877	46,857	38,177
14	D	33,071	8,978	15,405	15,405	24,106	24,093	17,666	17,666	8,965
14	**Total**	**547,590**	**59,657**	**109,314**	**270,150**	**322,004**	**487,933**	**438,276**	**277,440**	**225,586**
15	A	221,939	1,040	7,067	9,726	71,666	220,899	214,872	212,213	150,273
15	B	267,613	12,106	16,886	34,050	97,110	255,507	250,727	233,563	170,503
15	C	32,368	940	2,137	10,559	12,059	31,428	30,231	21,809	20,309
15	D	1,780	0	0	0	700	1,780	1,780	1,780	1,080
15	**Total**	**523,700**	**14,086**	**26,090**	**54,335**	**181,535**	**509,614**	**497,610**	**469,365**	**342,165**
16	A	56,957	411	3,350	9,148	10,343	56,546	53,607	47,809	46,614
16	B	45,602	1,009	2,048	11,812	12,713	44,593	43,554	33,790	32,889
16	C	11,279	72	5,096	5,096	5,096	11,207	6,183	6,183	6,183
16	D	2,124	309	309	309	1,503	1,815	1,815	1,815	621
16	**Total**	**115,962**	**1,801**	**10,803**	**26,365**	**29,655**	**114,161**	**105,159**	**89,597**	**86,307**

Table 3-67 (continued)

Province	1990 Strata[1] Class	Old Growth Acres	Cumulative Acres Harvested After 10 years	After 20 years	After 50 years	After 150 years	Old Growth Remaining After 10 years	After 20 years	After 50 years	After 150 years
17	A	27,552	299	299	8,628	12,339	27,253	27,253	18,924	15,213
17	B	29,078	870	870	11,139	16,233	28,208	28,208	17,939	12,845
17	C	6,747	120	2,754	2,754	3,892	6,627	3,993	3,993	2,855
17	D	1,576	39	39	39	1,056	1,537	1,537	1,537	520
17	**Total**	**64,953**	**1,328**	**3,962**	**22,560**	**33,520**	**63,625**	**60,991**	**42,393**	**31,433**
18	A	70,850	300	1,121	24,555	27,381	70,550	69,729	46,295	43,469
18	B	48,002	711	2,809	15,941	19,906	47,291	45,193	32,061	28,096
18	C	25,227	0	6,703	6,703	9,646	25,227	18,524	18,524	15,581
18	D	23,754	192	599	599	8,025	23,562	23,155	23,155	15,729
18	**Total**	**167,833**	**1,203**	**11,232**	**47,798**	**64,958**	**166,630**	**156,601**	**120,035**	**102,875**
19	A	119,962	0	0	2,259	2,399	119,962	119,962	117,703	117,563
19	B	64,347	0	0	180	880	64,347	64,347	64,167	63,467
19	C	10,677	0	60	200	300	10,677	10,617	10,477	10,377
19	D	3,219	0	40	40	100	3,219	3,179	3,179	3,119
19	**Total**	**198,205**	**0**	**100**	**2,679**	**3,679**	**198,205**	**198,105**	**195,526**	**194,526**
20	A	200,773	0	0	0	0	200,773	200,773	200,773	200,773
20	B	96,887	0	0	0	0	96,887	96,887	96,887	96,887
20	C	11,365	0	0	0	0	11,365	11,365	11,365	11,365
20	D	2,640	0	0	0	0	2,640	2,640	2,640	2,640
20	**Total**	**311,665**	**0**	**0**	**0**	**0**	**311,665**	**311,665**	**311,665**	**311,665**
21	A	76,404	0	0	3,499	4,379	76,404	76,404	72,905	72,025
21	B	32,779	0	0	1,558	1,678	32,779	32,779	31,221	31,101
21	C	5,099	0	0	159	159	5,099	5,099	4,940	4,940
21	D	520	0	0	0	0	520	520	520	520
21	**Total**	**114,802**	**0**	**0**	**5,216**	**6,216**	**114,802**	**114,802**	**109,586**	**108,586**

[1] Strata Class: A = 8 - 19,000 board feet/acre
B = 20 - 29,000 board feet/acre
C = 30 - 49,000 board feet/acre
D = 50,000+ board feet/acre

Recreation

Affected Environment

Changes Since the DEIS

Several changes to the recreation resource have occurred since the DEIS. The Tongass Timber Reform Act created six new, or additions to, Wilderness areas, which are further described in the Wilderness section. The legislation also created twelve "LUD II" areas. These areas are to be managed "in a roadless state to maintain their wildland character." These twelve legislated LUD II areas are further described in the Roadless section. Changes in this section as a result of these legislated areas are reflected in different data displays of the recreation supply, and carried through to the effects analysis.

Another change involves the identification of important recreation places. This is in response to public and agency comments concerning the lack of differentiation among recreation places, and the implications for change in a given alternative. The recreation section now contains a description of those recreation places that are important because they contain facilities, those of high value for commercial recreation and tourism, those with unique marine opportunities, and those with other features. The effects of the alternatives on these categories of recreation places are also displayed. To a greater extent than in the DEIS, important recreation places were considered in the selection of land use designations for the alternatives.

Additional description of the scientific methodology used in the inventory of supply and demand, as well as in the analysis of effects, is also provided. Some of the information is in Appendix B and the Socio-Economic section.

The physical recreation places inventory was updated since the DEIS, with particular emphasis on the Chatham Area. The resulting changes reduced the total acreage within recreation places but more precisely defined recreation opportunities on Admiralty Island. A section has been added on off-highway vehicle use and management.

The entire recreation section has been reorganized to display a clearer tie between the affected environment and the effects. The affected environment now more clearly displays the supply of opportunities, current recreation use and trends and demand estimates. The environmental consequences are organized to display the effects of the alternatives on the supply and on future use relative to that supply. Some tables and graphic displays have changed and additional tables on use, important recreation places, and benefit values of recreation have been added.

Background

The first portion of the Recreation section describes the concepts and techniques used in the inventory and analysis of the recreation resource. The supply of recreation opportunities is then displayed using these concepts. Use and demand discussions follow the supply discussion. Supply and demand are brought together in the environmental consequences section, which describes the potential effects to the recreation resource of implementing each alternative.

Several recreation issues are emphasized in the discussions on supply and demand, and tracked into the consequences section. These issues can be summarized as:

- tourism and its economic impact
- resident lifestyles and values
- and the pristine and unique nature of the recreation opportunities found on the Tongass.

Recreation Opportunity Spectrum

The Forest has the potential to provide a wide variety of recreation settings. The Recreation Opportunity Spectrum (ROS) has been developed to help identify, quantify, and describe these settings. The ROS system portrays the appropriate combination of activities, settings, and experience expectations along a continuum which ranges from highly modified to primitive environments. Six classifications are identified along this continuum and include rural, roaded natural, roaded modified, semi-primitive motorized, semi-primitive non-motorized, and primitive. A general Forest-wide inventory of the ROS classification was made in 1989, and is periodically updated. This baseline will be used to measure anticipated changes to the settings resulting from alternative allocations.

The Recreation Opportunity Spectrum classes are described below, using seven elements that are considered in the allocation and management of the associated recreation settings. These elements are:

Visual quality. A measurement of the degree of modification of the natural landscape characteristics that are apparent within the setting.

Access. The mode of access required or appropriately used in the pursuit of activities, and the relative ease with which users can travel to or within the setting.

Remoteness. The perceived separation of the setting from the sights and sounds of other human activity or structures.

Visitor management. The degree and appropriateness of the perceived control and regulation of visitor actions and the extent and appropriateness of services and information provided within the setting.

On-site recreation development. The degree and appropriateness of the recreation facilities provided within the setting.

Social encounters. The degree of solitude or social opportunities the setting provides, usually in terms of other parties encountered while traveling within the setting, and/or within sight or sound while camped within the setting.

Visitor impacts. The degree of impact both on the attributes of the setting and on other visitors within the setting.

These factors are now used to describe the ROS classes, with a comparative summary given in Table 3-68.

Rural

Visually, alterations to the landform and vegetation may dominate the landscape. Non-recreation activities and structures will be designed and located to not exceed the visual quality objective of Modification in the foreground along sensitive travel routes, or Maximum Modification in the middleground areas.

All methods of access and travel may occur within this class, but are subject to formal control and regulation for the safety of visitors and protection of structures and resources.

Moderate to high concentrations of people are expected much of the time, and remoteness from the sights and sounds of human activity is not available.

Recreation structures and facilities may be readily evident but are appropriate for the setting and designed to accommodate high levels of use. Information and interpretation facilities may be large and complex.

Visitor-caused impacts are often very noticeable, but are managed to prevent degradation of physical resources through paving and landscape designs which are in harmony with the overall landscape character and appropriate for the site.

Roaded Natural

Visually, alterations to the landform and vegetation remain subordinate to the landscape. Non-recreation activities and structures will be designed and located to not exceed the visual quality objective of Partial Retention. Existing visual conditions ranging from Preservation to Retention are fully compatible, and emphasizing these characteristics during project design is encouraged.

All methods of access and travel may occur within this class when compatible with intended activities. Zones of non-motorized use may be established for resource protection and the safety or comfort of users.

Moderate concentrations of people are expected much of the time, especially on trails and in dispersed areas such as beaches. Remoteness from continuous sights and sounds of human activity is expected.

Recreation structures and facilities are often present and provided for both site protection and user convenience. Facilities are of contemporary but rustic design which harmonizes with the natural setting.

Evidence of visitor use is noticeable, but not degrading to resource elements or exceed established visual quality objectives.

Roaded Modified

Visually, vegetative and landform alterations dominate the landscape. Non-recreation activities and structures are often very evident, but do not exceed the visual quality objective of Maximum Modification. Visual management techniques are applied in the foreground of sensitive travel routes and recreation sites to soften the effects of Maximum Modification conditions. Less dominant visual quality conditions are fully compatible and emphasizing these characteristics during project design is encouraged.

All methods of access and travel may occur within this class when compatible with intended activities. Off-highway vehicle use is allowed unless an area is specifically designated as closed. Zones of non-motorized use may also be established for resource protection and the safety or comfort of users.

Low concentrations of human-caused sights and sounds in a backcountry roaded setting are preferred, and remoteness from continuous sights and sounds of human activity is expected.

Recreation structures and facilities may be present, but are provided primarily for protection of the site rather than user convenience. Facilities, when present, are of rustic design which harmonize with the backcountry setting.

Evidence of human recreation use is noticeable, but not degrading to resource elements. Site hardening may dominate at campsites and parking areas, but is in harmony with, and appropriate for a backcountry roaded setting.

Semi-Primitive Motorized

Visually, alterations are few and appear subordinate to the landscape. Non-recreation activities and structures are designed and located to meet the visual quality objective of Partial Retention. Existing visual conditions ranging from Preservation to Retention are fully compatible, and emphasizing these conditions during project design and layout is encouraged.

Travel is primarily on trails designed and open to motorized vehicles, or on roads maintained for use by high-clearance vehicles, or by motorboats operating on waterways. Zones of non-motorized use may also be established for resource protection and the safety or comfort of users.

Low concentrations of people are expected and nearby sights and sounds of human activity are rare, but distant sights and sounds may occur. The setting is usually more than 1/2 hour walk or paddle from areas with higher use levels and most large structures. Except during peak periods of use, campsites are seldom within sight or sound of other groups.

Recreation structures and facilities may be present but are provided primarily for protection of the site rather than user convenience. Facilities, when present, are of rustic design which harmonizes with the natural setting.

Evidence of human recreation use may be noticeable, but not degrading to resource elements. Site hardening may dominate at campsites and boat or aircraft landing areas, but is in harmony with, and appropriate for a backcountry roaded setting.

Semi-Primitive Non-Motorized

Visually, alterations are few and appear subordinate to the landscape. Non-recreation activities and structures do not exceed the visual quality objective of Retention. A completely natural visual quality condition is fully compatible and maintaining this condition is encouraged during project design and implementation.

Travel is primarily on trails closed to motorized use or on freshwater lakes and streams using non-motorized boats, or may be cross-country. Use of aircraft, motorboats and snowmachines for traditional activities, subsistence, emergency search and rescue, and other authorized management activities may occur unless specifically restricted for safety and/or resource protection purposes.

Low concentrations of people in a roadless backcountry setting are expected and nearby sights and sounds of human activity are rare, but distant sights and sounds may occur. The setting is usually more than 1/2 hour walk or paddle from areas with higher use levels and most large structures. Campsites are seldom within sight or sound of other groups, except during peak periods of use.

Recreation structures and facilities may be present but are provided primarily for protection of the site rather than user convenience. Facilities, when present, are of rustic design which harmonizes with the natural setting.

Evidence of human recreation use is noticeable, but not degrading to resource elements. Limited site hardening, including boardwalk trails, may be used for resource protection, but is in harmony with, and appropriate for a natural appearing backcountry setting.

Primitive

Visually, alterations to the landscape are not evident. Non-recreation activities and structures do not exceed the visual quality objective of Retention. A completely natural visual quality condition is fully compatible and maximizing this condition is encouraged during project design and implementation.

Travel is primarily on trails closed to motorized use or on freshwater lakes and streams using non-motorized boats, or may be cross-country. Use of aircraft, motorboats and snowmachines for traditional activities, subsistence, emergency search and rescue, and other authorized management activities may occur unless specifically restricted for safety and/or resource protection purposes.

There are no, or very infrequent, sights and sounds of human activity. The setting is located more than 1.5 hours walking or paddling distance from any land-based human developments. Low concentrations of people in a roadless backcountry setting are expected and nearby sights and sounds of human activity are rare. There are no other groups within sight or sound of overnight campsites.

Recreation structures and facilities are rarely present and are provided primarily for the protection of the site and safety of the visitor. Facilities, when present, are of rustic design which harmonizes with the natural setting.

Evidence of human recreation use is essentially unnoticeable, and not degrading to resource elements. Site hardening is limited to boardwalk trails and necessary boat moorings or bearproof food caches.

Table 3-68
Comparison of ROS Classes

	Rural	Roaded Natural	Roaded Modified	Semi-Primitive Motorized	Semi-Primitive Non-Motorized	Primitive
Visual Quality	Alterations to landform and vegetation dominate landscape; non-recreational activities not exceed Mod - FG; Max Mod - MG	Alterations to landscape subordinate; non-recreational activities, not to exceed partial retention.	Alterations dominate the landscape; non-recreational activities/ structures evident, but do not exceed Max Mod.	Alterations few; subordinate to landscape, designed and located to not exceed partial retention.	Alterations few and subordinate to landscape; non-recreational activities and structures designed not to exceed retention.	Alterations to landscape not evident; non-recreational activities and structures do not exceed retention.
Access	All methods of access and travel may occur, but subject to formal regulation.	All methods of access and travel may occur, when compatible with intended activities; zones of non-motorized use.	All methods of access and travel when needed and compatible with intended activities.	Travel on trails designed for/open to motor vehicles; Roads maintained for high clearance vehicles; Motorboats operating on waterways, May establish zones of non-motor use for facility/resource protection.	Trails closed to motorized use; freshwater lakes and streams: use non-motorized boats.	Trails closed to motorized use; freshwater lakes and streams: use non-motorized boats.
Remoteness	Remoteness from sites and sounds of human activity not available or important.	Remoteness from continuous sounds of human activity is important.	Remoteness from continuous sounds of human activity is expected	Nearby sights and sounds of human activity are rare; Distant sounds may occur.	Nearby sounds of human activity are rare; Distant sounds may occur.	No or very infrequent sounds of human activity.
Visitor Management	Moderate to high concentrations of people at one time.	Moderate concentrations of people, especially on trails and in dispersed areas.	Low concentrations of other uses in a roaded setting is preferred.	Campsites seldom within sight or sound of another group.	Low concentrations of people in roadless backcountry.	Very low concentrations of people in roadless backcountry.

Table 3-68 (continued)

Comparison of ROS Classes

	Rural	Roaded Natural	Roaded Modified	Semi-Primitive Motarized	Semi-Primitive Non-Motarized	Primitive
On-site Recreation Development	Recreation structures and facilities readily evident, but appropriate for setting, designed for high use levels. Information and interp facilities may be large and complex.	Recreation structures and facilities provided for site protection and user convenience. Facilities contemporary but of rustic design. Harmonize with natural setting.	Recreation structures and facilities may be present, but are provided primarily for protection of the resource rather than user convenience. Facilities are rustic design which harmonizes with a backcountry setting.	Recreation structures and facilities may be present, provided primarily for protection of site rather than user convenience. Facilities, when present are rustic and harmonizes with natural setting.	Recreation structures and facilities may be present but provided primarily for protection of site. Facilities, rustic harmonic with the natural setting.	Recreation structures are rarely present, provided primarily for the protection of the site. Facilities, if present, rustic in natural setting.
Social Encounters	Moderate to high concentrations of people at one time.	Moderate concentrations of people, especially on trails and in dispersed areas.	Low concentrations of other users in a backcountry roaded setting is preferred.	Campsites seldom within sight or sound of another group except during peak periods.	Campsites seldom within sight or sound of another group except during peak periods.	No other groups in sight or sound of overnight camps.
Visitor Impacts	Very noticeable but managed to prevent physical resource degradation.	Visitor use noticeable but not degrading to resources; established VQO's.	Human use noticeable, but not degrading to resources. Site hardening dominates campsites; parking areas.	Human use noticeable, but not degrading to resource or backcountry setting.	Human use noticeable, not degrading to resource elements.	Human use essentially unnoticeable. Site hardening - boardwoaks, boat moorings, food caches.

Supply of opportunities

Southeast Alaska, of which the Tongass National Forest makes up about 80 percent, possesses a remarkable and unique combination of features, including inland waterways with over 11,000 miles of shoreline, mountains, fiords, glaciers, and large or unusual fish and wildlife populations, that provide opportunities for a wide range of excellent outdoor recreation experiences. Many of these opportunities cannot be duplicated elsewhere in North America, or most other places in the world. Southeast Alaska imparts a feeling of vastness, wildness, and solitude. These feelings are enhanced by the small resident population and relative absence of development compared to most other National Forests.

Recreation on National Forest is more than providing facilities or recreation sites. Especially on the Tongass National Forest, where most recreation attractions and much of the use occurs in remote, undeveloped areas, understanding the inherent values of recreation settings and their attributes and attractions is critical. Many Alaska residents purposefully live in proximity to such settings as a part of their lifestyle. Most visitors, who travel long distances to see Alaska, expect to find it wild and "unspoiled," while at the same time seek comfort and convenience, reliable transportation and other features requiring some level of infrastructure and development. The challenge to managers is to identify and understand the relationship between the settings and the variety of client groups that are seeking opportunities to participate in a wide variety of activities. Commercial providers of recreation activities base much of their marketing strategy on particular environmental settings and identified recreation places within those settings.

The two major Federal land management agencies, the Forest Service and the National Park Service, administer the largest units of public lands available for outdoor recreation. Table 3-69 displays the amounts of available recreation lands in public ownership.

Table 3-69

Distribution of public lands in Southeast Alaska available for outdoor recreation.

Type of Area	Acres
Federal	
Tongass National Forest	16,997,258
National Park System	3,238,604
State	
State Park System	65,463
State Forests	247,000
State Wildlife Refuges/ Critical Habitats	8,588
Municipal	
Municipal Parks	3,140
Private	
Commercial Recreation Areas	4

Source: Outdoor Recreation Alaska SCORP, 1988, Revision database, Qrxfinal (May 19, 1991)

While the large acreages of Federal lands are impressive, and contribute greatly to the feeling of vastness and solitude so predominant throughout Southeast Alaska, they are also deceiving in the amount of land area that is actually available and useable for outdoor recreation purposes. The difficult and steep terrain, wetlands, icefields and glaciers, and heavy vegetation confine most of the recreation activities to the accessible shorelines, river and stream bottoms, and around the many lakes within the Forest. Some use is made of certain parts of the icefields, and the alpine areas (above tree line) are popular for goat hunting, but access is usually by aircraft. Near the communities, residents and visitors alike use the developed camp and picnic grounds, beaches, and visitor centers.

The State of Alaska is a significant provider of recreation opportunities as well. Many of the state land selections (see "Lands" section of this Chapter) were based on recreation opportunities for local communities. Most of these opportunities are still undeveloped. State selections were also made for future development of a system of marine parks. Currently there are two designated State Parks and one State Historic Site in Southeast Alaska. Numerous other state recreation lands also exist, or are pending transfer of title.

In 1990, the Forest Service, the states of Alaska and Washington, and the province of British Columbia, entered into an agreement to cooperatively develop a system of marine parks stretching from Southeast Alaska to Puget Sound in Washington state. The goal is to identify and designate a system of parks and recreation areas for marine travelers no more than a day apart. These areas and travel routes will transcend a variety of managed and natural settings. Logistical needs, such as safe anchorages, supply and fuel stops, will be incorporated into this system. The State of Alaska has fourteen Marine Parks in Southeast Alaska. The majority of them are currently undeveloped. Another fifteen to twenty sites have been selected from the Tongass with the intent of requesting Marine Park designation.

Community road systems are limited, but heavily used for access to recreation sites and attractions near local communities. These road systems are primarily located near the larger communities of Juneau, Sitka, Ketchikan, Petersburg and Wrangell. There is an extensive road system interconnecting the small communities on North Prince of Wales Island, and systems developing near the communities of Hoonah and Kake. There is no interconnecting highway system between islands or between communities on the mainland.

Roads exist in other locations where timber harvest has taken place, but if there is no community or interconnecting access to the Alaska Marine Highway System (ferries) there is little recreation use made of them. Where a road system is accessible by the Alaska Marine Highway System, independent tourists and local users from other parts of Southeast use the road systems for recreational purposes. Less than 1,500 miles of open roads currently exist on the nearly 17-million acre Forest.

Opportunities

The goal of most recreationists, both resident and visitor, is to participate in and enjoy various outdoor recreation activities. Forest managers cannot provide recreation experiences, but they can provide the opportunities for these experiences to be realized. Recreation opportunities can be broken down into three components: 1) a choice of physical and social settings; 2) opportunities for activities to occur within those settings; and 3) a reasonable expectation that satisfactory experiences can be realized. The quality of the setting available and appropriate for the activity plays a key role in the outcome of the visitor's experiences.

Table 3-70 displays current amounts of opportunities Forest-wide, categorized by recreation opportunity spectrum (ROS) classes. This does not mean that these settings provide

opportunities on every acre: these will be limited by the topographic and logistical factors previously described.

Table 3-70
Forest-wide Recreation Opportunity Spectrum acres.

ROS Class	Acres
Primitive	11,382,783
Semi-Primitive Non-Motorized	2,997,126
Semi-Primitive Motorized	1,124,493
Roaded Natural	218,048
Roaded Modified	1,176,504
Rural	11,602
Urban	819

Source: Revsion data base, Q227b (May 6, 1991)

Recreation Places

The majority of the Forest is undeveloped and is primarily used for dispersed recreation activities. Concentrated use areas and facilities, such as visitor centers and campgrounds, in the vicinity of communities, are the exception. Viewing scenery and wildlife, boating, fishing, beachcombing, hiking and hunting are the principal dispersed recreation activities participated in by resident users.

Access plays a key role in the nature of how the outdoor recreation resource is used. Access is typically by boat, or by vehicle on community road systems. The use of aircraft for access is limited by the number of people that can be carried, and by the cost. (A typical round-trip flight for a party of four and their equipment to a lake 30 miles from a community with charter air service costs about $300-$400.)

The pattern of use associated with known protected boat anchorages, boat landings, aircraft landing sites, and the limited road systems, makes it possible to identify specific "recreation places." Recreation places are those areas that are easy to access and that are used for recreation activities. It is these specific places, and the quality of the settings that are associated with them, that constitute the effective supply of recreation opportunities throughout the Tongass National Forest.

Obstacles to access, both physical and economic, greatly influence the patterns and intensity of use throughout the Forest. The distance traveled to participate in outdoor recreation activities is typically limited by either the available community road system or by the distance capable of being covered by small boats during a day's activities. These "home ranges" were identified as recreation places lying within 15 to 30 miles of communities. For purposes of effects analysis, inventoried recreation places have been classified into two categories: those within a radius of approximately 20 miles from communities, and those lying outside.

In order to understand the recreation resource, as well as the effects of other management activities on the recreation setting, these specific geographic areas with recreation value were identified and tracked in the Revision data base. Nearly 1,400 recreation places, totalling approximately 4.4 million acres (26 percent of the total National Forest), have been inventoried Table 3-71.

Table 3-71

Tongass-wide summary of recreation places.

	Number of places	Acres (1,000's)	Capacity (1,000's)
Chatham Area			
Inside Wilderness	151	542	497
Outside Wilderness	361	1,472	1,918
Stikine Area			
Inside Wilderness	54	316	125
Outside Wilderness	337	646	397
Ketchikan Area			
Inside Wilderness	73	510	122
Outside Wilderness	418	845	969
Total Tongass			
Inside Wilderness	278	1,368	744
Outside Wilderness	1,116	2,963	3,284
Tongass-wide Total	**1,394**	**4,334**	**4,031**

Source: Revision data base, Q249 (June 1991)

As previously indicated, the setting of these recreation places plays a key role in their attractiveness and utility. Many recreation opportunities are dependent on this relationship and may require a natural type of setting, such as viewing scenery or the pursuit of solitude. However, some activities may not be directly dependent on the setting, such as hunting and fishing. The present setting of recreation places is displayed in Table 3-72.

Table 3-72

Recreation Opportunity Spectrum class summary for recreation places

ROS Class	Acres
Primitive	1,968,502
Semi-Primitive Non-Motorized	1,114,204
Semi-Primitive Motorized	814,315
Roaded Natural	149,591
Roaded Modified	330,497
Rural	6,184
Urban	0

Source: Revision data base (May 1991)

Recreation places can also be categorized into three general groupings, according to their principal uses and attraction:

Marine recreation. The marine setting is the most predominant of the outdoor recreation opportunities. There are 646,000 acres of beach in Southeast Alaska along approximately 11,000 miles of shoreline with thousands of sheltered waterways, inlets, bays and anchorages which provide access (by either boat or aircraft) to most areas with recreation attractions. Thirty-four percent of the inventoried recreation place acres are primarily related to marine recreation opportunities. However, approximately forty-one percent of the individually identified recreation places occur within this category. While the Forest Service manages the upland areas (above mean high tide), jurisdiction over the intertidal lands and the saltwater fishery is exercised by the State. This means that coordination between both levels of government is necessary to assure consistency in recreation settings and objectives.

A recent survey (Shea, 1990) indicates that there is a strong relationship between marine access and wildlife viewing opportunities on the upland areas, and that non-hunting wildlife use primarily accessed by boat is one of the fastest growing commercial recreation businesses in Southeast Alaska.

The family boat is used in the same manner as wheeled recreational vehicles are used in other places. The majority of use in marine recreation places originates in local community boat harbors or launching sites accessed by road systems. Typical day-use occurs within a 15-30 mile radius (Marine Recreation in the Tongass National Forest, University of Oregon, 1983).

The most popular activities participated in by users of marine recreation places are: beachcombing and hiking, fishing, motorboating, clamming and crabbing (Alaska Public Survey, 1983). Wildlife viewing is a rapidly increasing activity. Other popular activities are hunting onshore and kayaking/canoeing. For overnight users, the most popular activities remain the same with the addition of camping onshore and staying in cabins. However, many people's "favorite place" is further away and takes longer to reach than time allows for one-day outings. While the types of activity patterns are essentially the same at "favorite" and "most often visited" places the reason for differentiating between the two are subtle but important. Reasons given for why a place is "favorite" are remoteness, various land (setting) characteristics such as beaches, anchorages, and scenery. Reasons given for "most often visited" places are distinguished by qualities of access, convenience, facilities, and particular activity opportunities (University of Oregon, 1983).

Freshwater recreation. The Tongass also abounds in freshwater recreation opportunities. There are approximately 42,500 miles of perennial streams and rivers and over 20,000 lakes and ponds within the Tongass National Forest. Twenty-five percent of the inventoried recreation place acres are primarily related to freshwater recreation opportunities, and account for around twenty-one percent of the identified recreation places. Streams and some lakes near communities are accessed by the community road system or a combination of roads and trails. Away from the communities, the freshwater environment quickly becomes remote and is accessible only by air, or, in some cases, by small boats.

Eighty-one of the 145 Forest Service recreation cabins and shelters on the Tongass National Forest are located on or near freshwater lakes or streams. The limited system of trails from saltwater to inland lakes and along streams is important for recreation access to these sites.

The most sought-after settings at freshwater-related recreation places are those that provide opportunities for: 1) getting away (solitude); 2) enjoying natural and scenic settings; 3) fishing for a diversity of species; and 4) good airplane access (USDA Forest Service, Alaska Region Admin. Doc. 159, 1986).

Land-based recreation. While forty-one percent of the inventoried recreation place acres are primarily related to land-based recreation opportunities, they account for about thirty-seven percent of the places. The effective capacity of these areas is generally quite low. Many of these areas are located in the approximately 10 million acres of forested lands, nearly 4.3 million acres of alpine terrain (which contain about 3.75 million acres of icefields and rock) and over 1.5 million acres of muskeg. Some recreation use occurs in all these land areas, but in general, use occurs were access is more available. Where trails are available to access the alpine ridges and mountaintops, people use them.

However, the presence of this vast undeveloped area plays a very important role in providing the perceptions of naturalness and remoteness associated with the more defined marine and freshwater recreation places. Both of these attributes are rated as "very important" by 80-90 percent of the recreation users of the Tongass. When asked about sensitivity to change, natural-appearing settings and solitude were the setting attributes about which people were most sensitive (Clark and Johnson, 1981).

The most popular activities of users of the identified land-related recreation places are hunting, hiking (where there are trails), and driving for pleasure (where there are roads). The principal setting attributes of these places are access, remoteness from communities and developed sites, availability of parking sites for recreation vehicles (but without facilities), viewing scenery, exploring little-used roads, and freedom of choice of activities. These perceived attributes appear to be much the same on the Tongass NF as in other places in the Pacific Northwest (Clark, et al., 1984).

Facilities

Included within recreation places are developed recreation sites. These are campgrounds, picnic sites, trails, interpretive sites, cabins, and other sites which provide facilities for concentrated visitor use. These facilities, with the exception of cabins, are generally accessible from community road systems. An inventory of these facilities is found in Table 3-73. Facilities such as campgrounds, visitor centers, and picnic sites, will be managed to continue providing the existing setting attributes. Facilities such as trails and cabins may be subject to setting changes in the future. These are discussed further in the next section under quality, and will be displayed in the consequences section.

Table 3-73
Tongass Recreation Facilities

Facilities	Chatham Area	Stikine Area	Ketchikan Area	Tongass NF Total
Anchor Buoys	4	2	22	28
Campgrounds	3	1	10	14
# of Sites	92	15	59	166
Fishing Sites	0	0	0	0
Interpretive Sites	1	1	3	5
Historic Sites	0	0	1	1
Observation Sites	1	3	3	7
Organized Camps	1	1	1	3
Picnic Areas	8	7	10	25
# of units	74	21	47	142
Recreation Cabins				
in Wilderness	19	16	18	53
nonwilderness	33	26	34	93
on saltwater	12	26	15	53
Total Rec. Cabins	54	39	52	145
Recreation Residences	17	27	4	48
Recreation Road Miles	143	258	837	1,238
Resorts & Lodges	2	0	2	4
Other Concession	0	0	0	0
Ski Areas	0	0	0	0
Trails (# miles):				
nonwilderness	198.9	66.9	153.6	419.4
Wilderness	43.0	23.7	18.4	85.1
Total Trail Miles	241.9	90.6	172.0	504.5
Trail Shelters	8	5	12	25
Trailheads	3	32	13	48
Visitor Centers	2	0	1	3
Winter Sports	0	1	0	1

Revised: December 14, 1990

Several important recreation complexes exist on the Forest. These areas provide a variety of recreation opportunities such as camping, picnicking, hiking, fishing, etc., all within close proximity, and generally easily accessible from population centers. In addition they provide a natural setting and usually encompass a key attraction, such as a glacier or series of lakes and rivers. Some of these complexes have been designated as Special Interest Areas in recognition of their concentrated opportunities and unique settings. Existing Recreation Special Interest Areas include Admiralty Lakes, Mendenhall Glacier, and Ward Lake; several others are being proposed. For descriptions see the "Special Interest Areas" section of this Chapter.

Capacity

The ephemeral nature of capacity makes it difficult to precisely predict the capability of the Forest to provide for recreation opportunities. Changing values and needs of the public, international events, weather, economics, socialization, seasons, marketing, new technology, and many other factors lead to shifting public demands and expectations for recreation opportunities. In addition, the modes of travel within Southeast Alaska constrain the potential demand somewhat. The ferry system can only carry so many people and vehicles, and the communities can only handle so many cruiseships and aircraft.

An attempt, though, is made to inventory recreation places for their inherent capacity. This is directly related to ROS settings. Primitive settings have the ability to provide greater opportunities for solitude and remoteness, which require larger areas and fewer people. Hence, the capacity of these areas is lowest. On the other end of the spectrum, Roaded Natural and Rural settings provide opportunities such as picnicking and interpretive facilities for concentrated use, and thus have a much higher capacity.

The Forest has the ability to provide an indefinite capacity for some recreation opportunities. These include activities such as sightseeing, which take place off the forest, but use the Forest setting as the primary focus. They generally do not affect the recreation place capacity. The cruiseship industry is a prime example. Viewing scenery is a major attraction in Alaska, and is increasing in Southeast. It makes little difference whether one ship or ten ships pass through the Forest on the inland waterways. The limiting factors for them may be the amount of docking capacity at the communities, economics, marketing, or other logistical concerns, such as the number of inland excursions and tours available. Flightseeing is another example of indefinite capacity which does not directly affect recreation place capacity. At some point, overall scenic quality could be impacted and detract from the marketability of these industries. Visual Resource Management then becomes the key to maintaining the overall attractiveness of the Forest, and is discussed in the Visuals portion of this chapter.

Quality

Unique recreation opportunities. The unique setting that makes the Tongass different from other National Forest recreation opportunities is that of an island and marine environment in close association with major mountain ranges and ice fields. The marine interface that ties the sea with the land, is the most accessible and most sought after setting for recreation opportunities. It is also valuable for development activities and certain species of wildlife. This setting is also limited, relative to land-based opportunities.

More specifically, the Forest also offers vast unmodified landscapes and wildland wildlife and fish habitats unequaled on other National Forests. Because of the island and marine environment there is an abrupt change in character from the relatively small urbanized centers of population to almost immediate wilderness.

Outdoor recreation in Southeast Alaska is much more demanding of skills and proper equipment to deal safely with the environment than in most other Forests. There are newly-discovered wild caves with environments of unknown nature; multitudes of rivers and streams which could add new dimensions to the nation's Wild and Scenic Rivers System; and recreation opportunities that can only be accessed by boat or aircraft. The Region's recreation cabin system and interpretive program on the Marine Highway ferries are extremely popular and highly used by resident and visitor alike. And the opportunity to hunt and view large and, often dangerous, wildlife species is still available on the Tongass. But an underlying concern among many outfitters and guides throughout Alaska is the diminishing amount of primitive, uncrowded settings as more people visit and/or participate in wildland adventure activities.

Valuing recreation places. The recreation place inventory identifies those places important to some of these unique opportunities. They include areas important for facilities, tourism, home range, and marine recreation. Recreation places may contain one, several, or none of these values. This inventory indicates nearly 33 percent of the recreation places are important due to the presence of recreation facilities of some type, and around 44 percent of the places are important for the tourism industry which includes outfitters and guides as well as other tourism operations.

Over 42 percent of the recreation places are important to the unique marine recreation opportunities found on the Forest. This figure is somewhat different than the figures previously displayed for marine, land, and freshwater recreation places categories. These categories displayed the principal utility and attraction. The 42 percent figure represents the relationship of all recreation places valuable to marine recreation, which may include land-based recreation places as well, and may not necessarily include all of the marine category recreation places.

Recreation places important to fishing and hunting are also recognized as being important. Information on these places is still being analyzed.

The environmental consequences section describes the impact to these places by showing the relative change to the setting by management prescription groupings.

Use and Demand

Demand was examined using several existing studies. The primary ones include "Southeast Alaska Pleasure Visitor Research Program" (Data Decisions Group, Inc., 1988), "Findings of the Alaska Public Survey on the Importance of Natural Resources to the Quality of the Resident Life in Southeast Alaska" (University of Alaska, 1979), and "Alaska Outdoor Recreation Plan" (State of Alaska Department of Natural Resources, 1967). In addition sport hunting, fishing, wildlife viewing and other marine-oriented recreation information was used from the Alaska Department of Fish and Game. Information on arrivals and trends was obtained from local tourism councils, providers of transportation services, and Ranger District visitor use statistics.

The studies indicate general trends that can be interpreted in many ways. For the most part, data is analyzed beginning in 1975 and, in some cases, 1980. Significant increases and decreases occurred during this time. To account for these fluctuations, the data is "normalized" to indicate the average trend. A normalized set of data is one in which the increase or decrease for each year is added together, then divided by the number of years to give an average annual change. This eliminates the wide annual swings and makes the long-term trend more apparent.

For a century now, people have been venturing north to experience the scenic beauty of Alaska's Inside Passage. The actual numbers have been up and down, affected by two World Wars and major or minor economic depressions and booms. But overall, the tourism industry has grown substantially. The most consistent thread one can follow in the development of the visitor trade in Southeast Alaska has been the persistent demand for the natural scenic beauty. The attraction of wild, unspoiled scenery was evident in the writings of John Muir and others in the late 1800's. The Inside Passage has continued to grow in popularity, and has become the "single most highly promoted attraction in all Alaska" (Eric McDowell). It was true in 1879 when John Muir stepped off a mail steamer at Fort Wrangell, and it remains the center focus today as kayakers and cruiseship passengers alike explore the Inside Passage: "What is different about Alaska is, in a word, its wildness. What calls tourists is not what western civilization has done, but what it has not done" (Bright, 1985).

As may be expected, most outdoor recreation use occurs during the summer and fall months. Most tourist visitation is directly related to the cruiseship schedules which run from May through September. Resident Southeasterners use the coastal areas year-round during periods of favorable weather, but the bulk of the activity centers around the mild spring, summer and fall seasons and the concurrent fishing seasons. During the winter months many residents cross-country ski, snowmobile, and ice skate as conditions permit. Eaglecrest winter sports site located at Juneau is used heavily by the residents of Juneau and more infrequently by residents from other communities. However, many of the other residents travel to Canada, where alpine skiing opportunities are better.

Tourism

Tourists, or non-resident recreationists, can be broadly categorized into two major groupings: the adventure traveler and those passing through. The adventure travelers constitute a small, but growing group. They are characterized as those who get off the ferries and planes and engage in a variety of activities. They spend more time in the communities and on the Forest, and may secure the services of outfitters and guides, motels, and transportation services such as floatplanes, boats, and gas stations. Their itineraries are planned mostly by themselves. The other group passing through is indicative of the cruiseship clients, and many on the ferries who have further destinations in mind. This is a very large group which uses recreation places as a visual resource, and uses areas near communities. These visitors spend less time in the area, and often follow preplanned and regimented itineraries. The adventure travelers compete more directly with residents for recreation opportunities on the Forest, for recreation place capacity, facilities, and resources such as fish, game, and solitude.

The relationship between tourism (visitors from outside Southeast Alaska visiting Southeast) and outdoor recreation use by residents of Southeast is somewhat different than on many National Forests that are connected to the rest of the Continent by conventional highway systems. From 1975 to 1983 tourism and recreation use increased by 70-100 percent in Southeast Alaska. Cruiseship visitation increased by 115 percent, ferry system usage increased by 33 percent, and enplaning airline passengers at Juneau increased by 51 percent. Slower, but steady increase continue into the present. These figures are displayed in Table 3-74.

Table 3-74

Southeast Alaska visitation trends

Year	Cruiseships[1]	Alaska Ferries[2]	Airlines[3]	Icefield Landings[4]	Scenic Flights[5]
1990 (est)	240,000	-	-	34,765	11,100
1989	193,983 [6]	343,100 [7]	176,429	27,326	8,100
1988	198,870 [6]	344,209	167,314	25,018	8,500
1987	202,000	326,644	157,952	22,152	12,200
1986	164,400	296,070 [8]	156,667	17,553	11,900
1985	137,000	313,147	163,837	12,295	12,000
1984	118,781	311,459	168,685	1,986	7,000
1983	99,706	307,782	167,302	-	5,300
1982	87,358	300,000	150,871	-	5,200
1981	83,566	282,000	156,257	-	6,300
1980	86,815	276,000	155,699	-	3,000
1979	46,279	-	-	-	-
1975	-	230,000	110,660	-	-

A hyphen (-) denotes information not available.

[1] Total passengers aboard in Southeast Alaska reported by Cruise Line Agencies of Alaska.

[2] Total passengers off in Southeast reported by Alaska Marine Highway Traffic Reports.

[3] Departures for Juneau Airport - Alaska and Delta Airlines received from Juneau Airport Managers' Office.

[4] Mendenhall Icefield Helicopter Landings; Total passengers - Temsco and ERA Airlines from Juneau Ranger District, Special Use Records.

[5] Scenic Flight Passengers - Misty Fiords and Ketchikan,total passengers-rounded to nearest hundred from Misty Fiords National Monument.

[6] Bankruptcy by large company reduced total passengers these years.

[7] Threat of strike reduced passengers late in season.

[8] Two Seattle-run vessels (one trip per week) reduced total traffic.

During the summer of 1988 a comprehensive survey of visitors to Southeast Alaska was conducted to measure the economic impact of tourism on the region's economy (Data Decisions Group, Inc., 1988). One of the major findings was that "visitors" (those arriving in Southeast Alaska for other than work or business) spent about $74 million while in Southeast Alaska, establishing that tourism is Southeast Alaska's third largest "industry".

Some of the other findings about tourism in Southeast Alaska were:

- 87 percent (369,200) of all arrivals to Southeast Alaska were "visitors" (as defined above).
- 98 percent of these visitors came from outside Alaska (see Table 3-75).
- Southeast drew an estimated 70 percent of the entire state's pleasure visitors in the summer of 1988.
- There were 34 percent more pleasure visitors in 1988 than in 1985.
- 67 percent of those visitors staying overnight did so aboard cruiseships, 19 percent stayed in hotels or motels, and 13 percent stayed aboard ferries.

Another survey of businesses which provide non-hunting wildlife uses (photography, viewing, study) shows this type of use is increasing rapidly. About 90 percent of the clients of 200 firms which provide this type of recreation service are non-residents of Southeast Alaska. This business activity is growing as much as 33 percent annually, and client expenditures contributed substantially to the economy (Shea, 1990).

The marketing of recreation opportunities by commercial suppliers has important similarities to resident recreation concerns. For example, businesses which provide boat or aircraft access for wildlife viewing and other activities have a low tolerance for the presence of other groups in the same area. The presence of more than two or three other parties in a bay will cause such operators to seek substitute locations. The ability to market Alaska tourism, in part due to the high cost of visiting Alaska, is dependent on meeting customer expectations of seeing and experiencing a vast, awe-inspiring, untamed land and its wildlife.

Table 3-75

Geographic origin of Southeast Alaska pleasure visitors

Visitor origin	Percent of all visitors
Alaska	2
Western US	33
California	18
Washington	4
Midwest	18
South	18
East	15
Canada	10
Overseas	4

Source: Southeast Alaska Pleasure Visitor Research Program, 1988, p.59.

Resident Lifestyle and Outdoor Recreation Needs

The distance from Alaska to the lower 48 States and other parts of the world (with the exception of Canada), and the associated travel cost, are major reasons for the difference between resident recreationists and the visitors described in the survey. The survey indicates that visitors are generally older, often purchase package tours, utilize many expensive services, and spend relatively little time in remote settings while in Southeast Alaska. They travel primarily by ship and by air. This is in contrast with most places in the rest of the United States where the two groups are often much less distinctive (primarily due to motor vehicle travel).

Unfortunately, historic reporting of recreation use does not separate visitors and residents, making it impossible to distinguish the effects or values of the two groups from existing data. The State, while maintaining reasonably good records about visiting tourists, has no similar studies about resident impacts, values, desires, needs, or the effect of tourism on resident recreation opportunities.

Local residents of Southeast Alaska seem to value highly the opportunities for remote, uncrowded wildland and marine outdoor recreation. Most of Southeast Alaska is known for its abundant opportunities to "get away from it all." Many residents take advantage of this fact and frequently head for the wilds to boat, fish, hunt, camp, hike, beachcomb, pick berries, and to do the many other things possible in this vast region. Although the number of residents is small, many spend more time out of doors than their counterparts in the Lower 48. Because of the highly dispersed nature of this type of recreation, much of it is inconspicuous and easily overlooked and information about the amount of dispersed use is difficult to obtain. The most recent information available about the recreation habits and effects of the local resident is the Alaska Public Survey (1979).

Because of the nature of the geography and jurisdictional patterns in Southeast Alaska, it is assumed that most dispersed recreation takes place on National Forest lands or the saltwater immediately adjacent to National Forest Lands. The currently available data appears to either underestimate the nature and extent of many recreation activities or overcompensates in inconsistent ways. The net result is that while there is a general intuitive feeling by many that outdoor recreation opportunities and activities are highly important to residents, there is little recent documented evidence to clearly support this intuition.

The 1979 Alaska Public Survey did indicate the close attachment many residents have for the region. To quote from the report:

> "Perhaps the most important findings are:
>
> The importance of the region's natural resource base in providing an attractive setting in which to live and recreate. We found that, for many, the importance attached to and satisfaction derived from the region's environmental setting overshadowed the economic opportunities that the natural resource base provided. There is little substantial information to collaborate the belief, especially in the case of residents.
>
> The strong attachment of residents to the region. Southeasterners live in the region longer, are more satisfied with community life there, and are more likely to mention other places in their present region of residence as good places to live than are the residents of Southcentral and Interior Alaska we interviewed.
>
> Both of these tend to distinguish Southeasterners from other Alaskans we interviewed and explain their great concern with natural resource planning for the region's public lands. Because of their strong ties to the region, they are likely to persevere through considerable economic inconvenience, such as might accompany a major change in the region's economy, before they would move elsewhere. Many expressed an interest in pursuing

another line of work if necessary to remain in the region." (Alaska Public Survey—Residents and Resources, ISER, University of Alaska).

Between 1967 and 1979 resident recreation "demand" changed significantly. The population increased about 1/3 and demand for recreation opportunities followed. There was also an increase in the per capita participation rate. The average southeastener spent twice as much time participating in outdoor recreation activities than in 1967. This indicates a growing interest in recreational activities activities, much the same as the rest of the United States during the same period of time. On the other hand, for the first time the cost of pursuing recreation opportunities (boating and flying) was frequently mentioned as a barrier to participation. Outside of "lack of time" and "weather", the most significant "barrier" to participating in recreation activities in 1979 was stated to be insufficient places accessible from their communities for dispersed recreation. As the cost of access to recreation opportunities and places becomes more of a barrier to participation, the location of available sites and places become more important. Other barriers mentioned frequently were "equipment cost" and "need for better information about how and where to go."

In 1967, the lack of facilities was the most mentioned problem. This concern seemed to have been alleviated by 1979. Current public scoping indicates a rising concern about reopening trails, or building new trails near communities.

A sizeable number of residents in 1979 indicated they would stop going to their favorite place if any of a number of development-related activities took place there. The two most detrimental changes that people feared would take place were: 1) more people (crowding), and 2) new timber harvesting activities.

Tables 3-76 and 3-77 indicate the activities participated in by Southeast Alaska residents in 1978-79.

Changes in Resident Recreation Patterns

Several factors influence total resident recreation demand. Three important ones are: regional population, per capita participation, and recreation travel behavior. These are discussed below.

Regional population. As a region's population increases, so too should the demand for recreation opportunities in the region. If the pattern of recreation remains constant, the increase should be essentially proportional. In the five decades since 1930 the population of Southeast Alaska has increased more than 20 percent per decade except during World War II. Between 1967 and 1979 the region's resident population increased by about a third to approximately 60,000 people. In the past decade the State, as a whole, experienced a significant boom/bust economic shift triggered by the world pricing of oil, timber and fish.

The result has been a rise and then fall of resident population to a point about equal to the population of 1979. The prognosis for the next decade is for the population of Southeast Alaska to show a slow increase, and a similar increase is expected for resident recreation use.

Table 3-76

Most popular outdoor recreation activities in Southeast Alaska 1978-79

Activity	Annual Days Per Capita[1]
Walking, running for pleasure	44.0
Driving for pleasure	27.0
Hiking, beachcombing	25.0
Motorboating	24.0
Playing outdoor sports and games	22.0
Fishing	16.0
Bicycling	6.8
Camping	6.1
Hunting	4.7
Spectator sports	4.5
Canoeing and kayaking	3.8
Swimming, scuba diving	2.2
Summer OHV travel	2.1
Sailing, winter OHV travel	1.7
Flying, downhill skiing	1.6
Cross-country skiing	1.3
Hang-gliding, golf	<1.0

Source: Alaska Public Survey, Residents and Resources, ISER, University of Alaska, 1979.

[1] Average annual participation days per capita by Southeastern Alaska adult residents in 1978-79.

Table 3-77

Southeast Alaskan resident recreation taking place on the coast[1]

Activity	Percent of Days on the Coast
Motorboating	89
Kayaking, canoeing	74
Sailing	Insufficient data
Fishing	80
Clamming, crabbing	100
Hunting[2]	79
Camping	34
Swimming	64
Hiking, beachcombing	89
All dispersed recreation[3]	75

Source: Alaska Public Survey - Residents and Resources, ISER, University of Alaska, 1979.

[1] On the coast refers to recreation activities occurring along saltwater shores.

[2] Assumes all deer and waterfowl hunting is coastal, all other noncoastal.

[3] Includes above activities summer and winter off-road vehicles, travel, flying, cross-country skiing, all of which are assumed to be noncoastal.

Per capita participation. The pattern of people's recreation changes through time; because of this, recreation demand projections are more than simply population projections. Table 3-78 highlights changes in per capita participation by Southeast Alaska residents between 1967 and 1979.

Some of the most popular activities (such as hunting, and fishing) exhibited no significant change. Eight activities, snowmobiling, canoeing, cross-country skiing, motorboating, snowplay, downhill skiing, camping and bicycling, experienced increases exceeding 50 percent in the 12-year period. Overall, this shift or substitution appears to favor dispersed, nonconsumptive recreation activities, those requiring a large land or water base per recreationist. This may be indicative of the relative decrease of these opportunities for uncrowded and highly scenic settings elsewhere in the country and many foreign countries.

Over time, the supply of certain recreation opportunities in Southeast Alaska has increased: road systems have expanded into previously inaccessable areas, the number of Forest Service recreation cabins and other facilities has increased, and visitor services and tourism marketing have increased. The advent of the all-terrain vehicle (ATV) is playing a role in how local residents view the construction and management of roads (for example, there is a strong desire to allow continued use of ATV's for hunting and fishing.) In some cases, supply-induced increases in participation have occurred. This appears to be the case on Prince of Wales and Mitkof Islands where road systems developed for timber harvesting created an opportunity for road-related access to previously inaccessible recreation settings and an opportunity for recreation activities involving wheeled vehicles (something that was relatively rare in those parts of Southeast Alaska). Use increased, but existing capacity now is greater than demand, primarily because the resident population on the islands is low and the Alaska Marine Highway system has a limited capacity to bring outside visitors and their vehicles to the islands.

Supply-induced participation changes have also been accompanied by additional demand for specific recreation places or facilities for a related activity. With increased opportunities for roaded access and activities came the need for fisher parking, dispersed campsites, picnic sites, trails to scenic attractions, and additional short access routes to cabin sites and previously inaccessible beaches. Increased tourism has resulted in increased demand for interpretive services, and walking and hiking opportunities near the major communities.

Table 3-78

Changes in the ways Southeast Alaskans engaged in recreation activities: 1967-1979

	Percent Change in Average Annual per Capita Days	Absolute Change in Average Annual per Capita Days
Activities Showing Increases		
Snowmobiling	1,530	+1.6
Canoeing	529	+3.2
Cross-country skiing	317	+1.0
Motorboating	149	+12.2
Snow play	144	+2.0
Downhill Skiing	114	+0.8
Camping	110	+3.3
Bicycling	88	+6.3
Walking, running for pleasure, hiking, and beachcombing	52	+14.7
Activities Remaining the Same[1,2]		
Hunting, Fishing, Flying	No Change	No Change
Play outdoor Games & Sports	No Change	No Change
Activities Showing Decreases		
Driving for pleasure	23	-8.2
Outdoor swimming	33	-2.2

Source: Alaska Public Survey - Residents and Resources, ISER, University of Alaska, 1979.

[1] "Statistical uncertainty in average annual per capita participation days for specific activities is typically 5 to 15 percent for both 1967 and 1979 data, but ranges higher for less frequently engaged in activities. With these uncertainties, we can only say that change in these activities, if any, has been small (20 percent over 12 years). We cannot quantify that change more precisely." (Alaska Public Survey, Residents and Resources, ISER, University of Alaska, 1979.)

[2] This data comes from the 1979 Alaska Public Survey. More recent information on hunting and fishing is available in surveys conducted by the Alaska Department of Fish and Game and is summarized in the sections on Fish and Wildlife in this chapter. Projected long-term demand for hunting and fishing can be found in the section called 'Resource and Demand Analysis' in the Economic and Social Environment portion of this chapter.

The Alaska Public Survey data for Southeast Alaska seems to show that although there is a rising concern about the costs of accessing desired places, people are not turning away from outdoor recreation activities, but are, in fact, increasing their participation. Public scoping indicates a desire from many people for more hiking trails and other dispersed recreation opportunities made available close to communities. Along with this desire is the concern that those recreation places within normal travel distances be protected from adverse change. There is also a part of the population in each of the communities that do not have the financial capability to travel beyond the range of the local road system for outdoor recreation purposes, including fishing.

The non-consumptive use of wildlife appears to be increasingly important to the lifestyle and the economy of Southeast Alaska, yet little is specifically known about this user group, or the important use areas, the target species, the types and amounts of other uses that may compliment or conflict with the use, or the effects of the use on the wildlife species involved. In 1989 the Alaska Department of Fish and Game conducted a survey of 204 known businesses in Southeast believed to serve this user group. The 62 percent response rate indicated that there were about 120 businesses that are at least partially dependent on non-consumptive wildlife

uses. In 1989 these businesses served approximately 146,000 clients who spent over $43 million. The survey also indicated that the principal concerns within this relatively new industry are that the current quality may be adversely affected by logging, remote home-sites, increases in small aircraft use, coastal hatcheries and mariculture, and increased use by other recreationists. Currently, the natural-appearing landscapes and low levels of encounters with other recreation users contribute significantly to the perceived quality of the experience being realized.

Interestingly, the 1979 Alaska Public Survey did not identify non-consumptive use of wildlife (or wildlife observation) as an activity. This may be an indicator of changing values for both residents and visitors.

Off-Highway Vehicles. The use of off-highway vehicles (OHV's), often referred to as off-road vehicles (ORV's), is a growing activity in the Forest. Their use on the Tongass National Forest is limited due to topography, lush vegetation, and wet soils. Trails are generally planked or involve excessive grades, and are not designed for OHV's. The steep topography is also not conducive for designing new trails for OHV's. However, as the road system expands and technology and design improves, so have opportunities for OHV use. Activities include snowmobiling, access for camping, hunting, fishing, and subsistence purposes, and riding for pleasure and challenge. Road systems connected to communities are used most often, with riders seeking out primitive roads or spurs, usually associated with timber harvest areas. Use of remote road systems on islands is increasing, with lighter weight OHV's and bigger, more powerful boats to transport them.

Along with increased use, increased concern for resource impacts has surfaced. The limitations on accessibility often result in OHV use on muskegs, beaches, tidal areas, river channels during low flows and sensitive wildlife habitats, and effects to non-motorized recreationists. Executive Order 11644, as amended, directs that federal public land agencies, such as the Forest Service, "will ensure that the use of off-road vehicles on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands."

OHV's are managed according to State law and existing Forest Service policy. The Forest is currently managed as open to OHV use unless specifically designated otherwise. This management strategy is planned to continue for the next 10-15 years. A comprehensive travel plan exists for the Juneau vicinity that addresses OHV use. Other areas on the Tongass have site-specific and/or seasonal closures to deal with resource conflicts and impacts. It is likely resource and user conflicts will arise in the future. Resolution of these concerns is best dealt with at the project, or site-specific, level.

Methodology and Scientific Accuracy

The supply of recreation opportunities is inventoried and described using two concepts: the Recreation Opportunity Spectrum (ROS) and Recreation Places. These concepts describe the quantity of recreation opportunities. Quality is described using the "Home Range" concept and by assigning a value to the recreation places. All of these concepts have been discussed in detail previously.

Recreation places were inventoried throughout the Tongass National Forest using the principles of the ROS and Visual Resource Management systems and incorporating the principles from Dr. Roger Clark's work (Pacific Northwest Station) on the *Role of Site Attributes in Determining Potential Recreation Sites in Coastal Alaska* (R. Clark, In Press). The inventory considered both the physical and social attributes of the settings. The result was identification of sites and areas of known use and attractions which represent the land area necessary to reasonably meet the physical and social setting requirements for given ROS standards. A

comprehensive inventory of Recreation Places was conducted on the Tongass National Forest in 1988 and 1989. This inventory is continually updated and refined as new information is gained and visitor use patterns change. Overall these changes are generally minor. Using the knowledge of field personnel at the Ranger District level, approximately 1,400 specific recreation places, totaling approximately five million acres (29 percent of the total National Forest Land), have been inventoried.

The actual location of recreation places within the home range has been refined to better reflect local conditions, such as access along protected waters versus access over large exposed bodies of water, and the relative value or scarcity of an opportunity resulting in travelling beyond the 20-mile guideline for day-use trips. Recreation place values were assigned by district and area recreation personnel knowledgeable about their areas and the customers served, with some assistance from recreation users and other agencies.

The demand for recreation is described by examining studies on tourism and resident lifestyles (previously cited). State population forecasts for Southeast Alaska along with recreation use information is used to project demand. By analyzing trends in recreation participation and population growth, the supply and demand sides are brought together to display how alternatives impact both the quantity and quality of recreation opportunities. Discussions and results are found in the economic and social sections as well as this section.

Information Needs

Perhaps the largest obstacle to comprehensive planning for recreation and Wilderness management on the Tongass National Forest has been the lack of reliable information concerning the use and value of the outdoor recreation resources. The Alaska Public Survey conducted in the late 1970's contains much of the most recent information available. Social and economic values have no doubt changed since that time, but little information is available as to specifically how.

Better and more up-to-date information is needed to support and guide resource allocation and management decisions. Primary needs begin with developing the ability to accurately count and identify the kinds of activities people are engaging in, and concurrently surveying users to gain information on the relative value and quality associated with opportunities for outdoor recreation, to measure current demand for opportunities and services, and to help make projections of future demands.

The ongoing State tourism surveys are not designed to provide information for use in developing strategies which recognize the amount and nature of the role the public lands play in the State's tourism industry, and these surveys ignore the use by, or impacts on, local residents.

A continuation of the Southeast Alaska Pleasure Visitor Research Program designed and conducted in 1988 would be useful to follow the trends in recreation and tourism affecting Southeast Alaska's economy.

Similarly, the Alaska Public Survey of residents could be updated, and perhaps expanded to the same depth and specificity as the TRUCS study of subsistence use in Southeast. Both these surveys, and the results of public scoping, indicate that the opportunities to participate in outdoor recreation by residents are as highly valued and important to the overall lifestyle and social well-being as are subsistence activities. Such information is important to the management of the recreation resource.

Recreation

Environmental Consequences

Direct, Indirect, and Cumulative Effects

Implementing the integrated management direction contained in the land use designation management prescriptions and Forest-wide standards and guidelines will minimize the loss of recreation places. However, some alternatives have the potential to cause significant effects on the physical and/or social character of the inventoried recreation places found on the Forest. The analysis will focus on the consequences to the recreation resource, by analyzing changes in Recreation Opportunity Spectrum (ROS) classes, recreation places settings, highly valued recreation places, and implications for local residents and tourists alike.

Table 3-79 shows the approximate number of Recreation Place acres that are within each land use designation, by alternative.

Table 3-79

Recreation place acres within each land use designation, by alternative

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. P
Wilderness	645,381	645,381	645,381	645,381	645,381
Wilderness National Monument	742,463	742,463	742,463	742,463	742,463
Nonwilderness National Monument	12,249	12,249	12,249	12,249	12,249
LUD II	343,917	343,917	343,917	343,917	343,917
Research Natural Area	10,183	18,849	12,967	4,994	7,904
Primitive Recreation	670,332	732,434	299,978	351,936	296,079
Enacted Municipal Watersheds	9,314	9,314	9,314	7,995	10,254
Old-Growth Forests	282,215	11,252	169,544	12,250	103,927
Semi-primitive Recreation	924,396	1,105,264	242,159	986,041	444,919
Experimental Forest	3,796	3,796	10,243	3,796	3,796
Scenic Viewshed	166,577	128,237	190,501	23,109	454,418
Modified Landscape	85,143	173,662	446,460	302,133	275,695
Timber Production	33,376	118,996	774,944	734,871	541,844
Minerals	0	0	0	0	0
Beach Fringe/Estuary	140,126	89,341	267,366	0	180,110
Stream/Lake Protection[1]	56,076	74,652	210,657	167,615	193,118
Special Interest Areas	46,157	48,358	7,293	8,354	47,858
Wild Rivers	145,253	81,014	0	26,949	40,183
Scenic Rivers	34,876	18,821	0	120	15,186
Recreation Rivers	31,902	25,294	0	8,864	13,637
Other Area	1,707	2,143	0	2,401	1,866

Source: Revision data base Q249C, (5/16/91)

[1] Alternative D figures are for the Fish Habitat and Water Quality Requirements LUD.

Effects on Supply

Recreation Opportunity Spectrum (ROS)

The mix of recreation opportunity settings will vary by alternative. ROS is an inventory tool, a result of many factors which can change over time. Knowing site specific changes, ROS can be used as a predictive tool to describe future setting opportunities. Given the programmatic nature of this planning document, it is not possible to predict the changes that would occur from implementing any given alternatives.

In general, some setting assumptions can be made for the various land use designations. However, many site-specific exceptions may occur to these assumptions. For instance an area identified for timber production will likely change to a Roaded Modified setting, but may not due to lack of suitable timber, topographic features, or no projects scheduled during the Plan period. A portion of it may maintain a Semi-Primitive setting. While the extent of these influences or exceptions are not quantified, they likely balance out when looking at the changes Forest-wide. Thus some ROS assumptions were made for the land use designations to provide a predictive look in comparing the relative impacts of the alternatives.

Four general categories were identified, each containing a range of ROS settings. The developed category encompasses the roaded modified, rural and urban end of the spectrum, with some overlapping into the Roaded Natural and even Semi-Primitive Motorized settings. It includes land use designations which allow timber harvest. The transition category includes allocations primarily resulting in Roaded Natural and Semi-primitive Motorized settings, with some overlap into the Roaded Modified and Semi-primitive Nonmotorized settings. It represents the middle of the opportunity spectrum, and includes allocations such as Semi-primitive Recreation and Scenic Viewshed.

The primitive category covers the undeveloped end of the spectrum, mainly Primitive and Semi-primitive settings, with some overlap into the Roaded Natural setting. It includes allocations such as Old-Growth Habitat and Primitive Recreation. Wilderness and Monument settings remain constant in all alternatives, and encompass the primitive setting groups as well. As alternatives prescribe more development activities, the likelihood to influence fringes of these areas increases.

Table 3-80 summarizes the effects of each alternative on these recreation setting groups, in terms of acres. Note the Wilderness and Monument category remains constant, representing over 35 percent of the Forest. The following discussion will refer to the remaining acres, in terms of the percent outside of this category. (Note: These are different groupings than the land use designation groups used elsewhere.)

Table 3-80
ROS predictive categories, by alternative

Alternative	Developed	Transition	Primitive	Wilderness/Monument
A	2,917,639	1,145,507	7,003,089	5,931,023
B	3,558,678	1,048,174	6,459,383	5,931,023
C	5,152,975	1,128,524	4,784,736	5,931,023
D	4,949,002	692,422	5,424,811	5,931,023
P	4,689,163	1,156,040	5,221,032	5,931,023

Source: Revision data base, Qrxfinal (May 29, 1991)

Alternatives A and B maintain the greatest amount of remaining forest in the primitive settings group, at over 63 percent and 58 percent respectively. Alternative C maintains the least primitive settings group, 43 percent, and places the largest area of remaining forest, nearly 47 percent, in the developed settings group. Alternative D likely results in the second highest acreage in the developed settings group, nearly 45 percent, much at the expense of the transition group, as 49 percent remains in the primitive group. Alternative P, outside of Wilderness and Monuments, results in over 42 percent of the Forest in the developed category and 47 percent in the primitive group. All alternatives except D have around 10 percent of the acres in the transition group.

Recreation places

Changes in the character of the recreation place settings are described in terms of the land use designation groups. These groups are different from those just discussed in the ROS section, due to the site-specific nature of Recreation Places. Recreation Places are specifically addressed in the management prescriptions and Forest-wide Standards and Guidelines, which will assist in maintaining the character of the setting. To determine the impact or degree of change for a specific recreation place, one must use the alternative map to determine which land use designation the area falls within, and then refer to the management prescription for that LUD.

At this time, no correlated analysis of how many and what kind of recreation places are included in the corridors of rivers eligible and recommended for inclusion in the National Wild and Scenic Rivers System. Undoubtedly there are numerous recreation places associated with Wild and Scenic River candidates. In the interim period, before any actual designation, recreation places will be managed to maintain the outstandingly remarkable features of recommended rivers.

The importance of home range recreation places has been discussed. Outlying recreation places also have special importance to residents or visitors engaging in multi-day trips, and for commercial outfitters, most of whom market the remoteness and solitude of these places. Thus three categories of recreation places are described: Forest-wide recreation place acres, acres within home ranges, and acres outside home ranges. Table 3-81 summarizes the effects of each alternative on recreation settings in terms of the land use designation groups for these three categories. It is the relative change in these groups that is being considered in the following discussions of alternatives. Figures 3-23, 3-24 and 3-25 visually display these three categories.

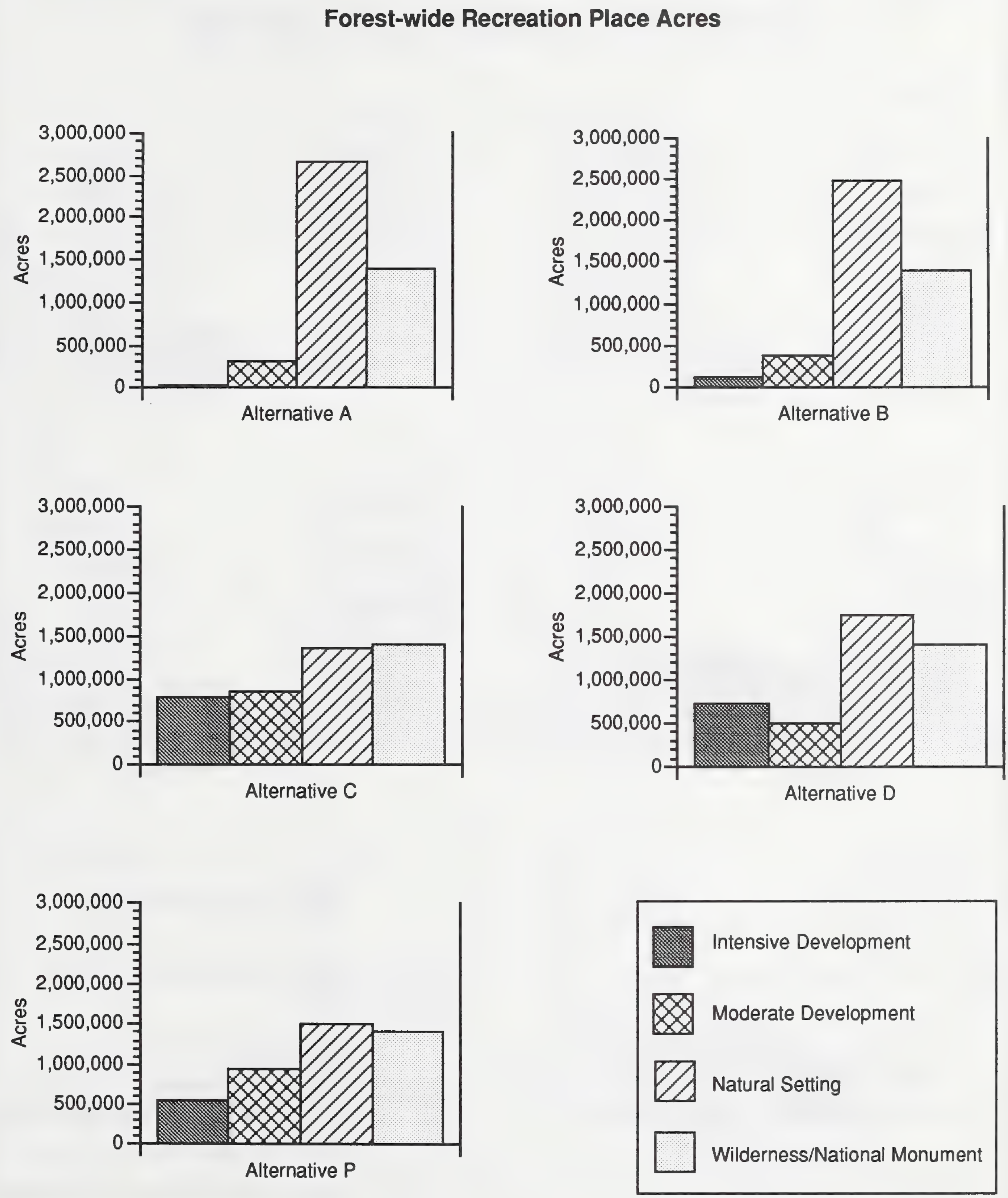
Table 3-81

Forest-wide recreation place acres summary, by land use designation groups

	Intensive Development	Moderate Development	Natural Setting	Wilderness
Alternative A				
Home Range	16,679	178,836	1,430,137	552,290
Rest of Forest	16,697	124,222	1,217,551	847,803
Total	**33,376**	**303,058**	**2,647,688**	**1,400,093**
Alternative B				
Home Range	55,216	287,411	1,283,025	552,290
Rest of Forest	63,780	88,538	1,206,153	847,803
Total	**118,996**	**375,949**	**2,489,178**	**1,400,093**
Alternative C				
Home Range	454,094	537,009	634,528	552,290
Rest of Forest	320,850	320,011	717,610	847,803
Total	**774,944**	**857,020**	**1,352,138**	**1,400,093**
Alternative D				
Home Range	169,952	345,173	1,110,527	552,290
Rest of Forest	563,857	150,979	643,634	847,803
Total	**733,809**	**496,152**	**1,754,161**	**1,400,093**
Alternative P				
Home Range	332,332	574,593	718,687	552,290
Rest of Forest	209,532	357,785	791,073	847,803
Total	**541,864**	**932,378**	**1,509,760**	**1,400,093**

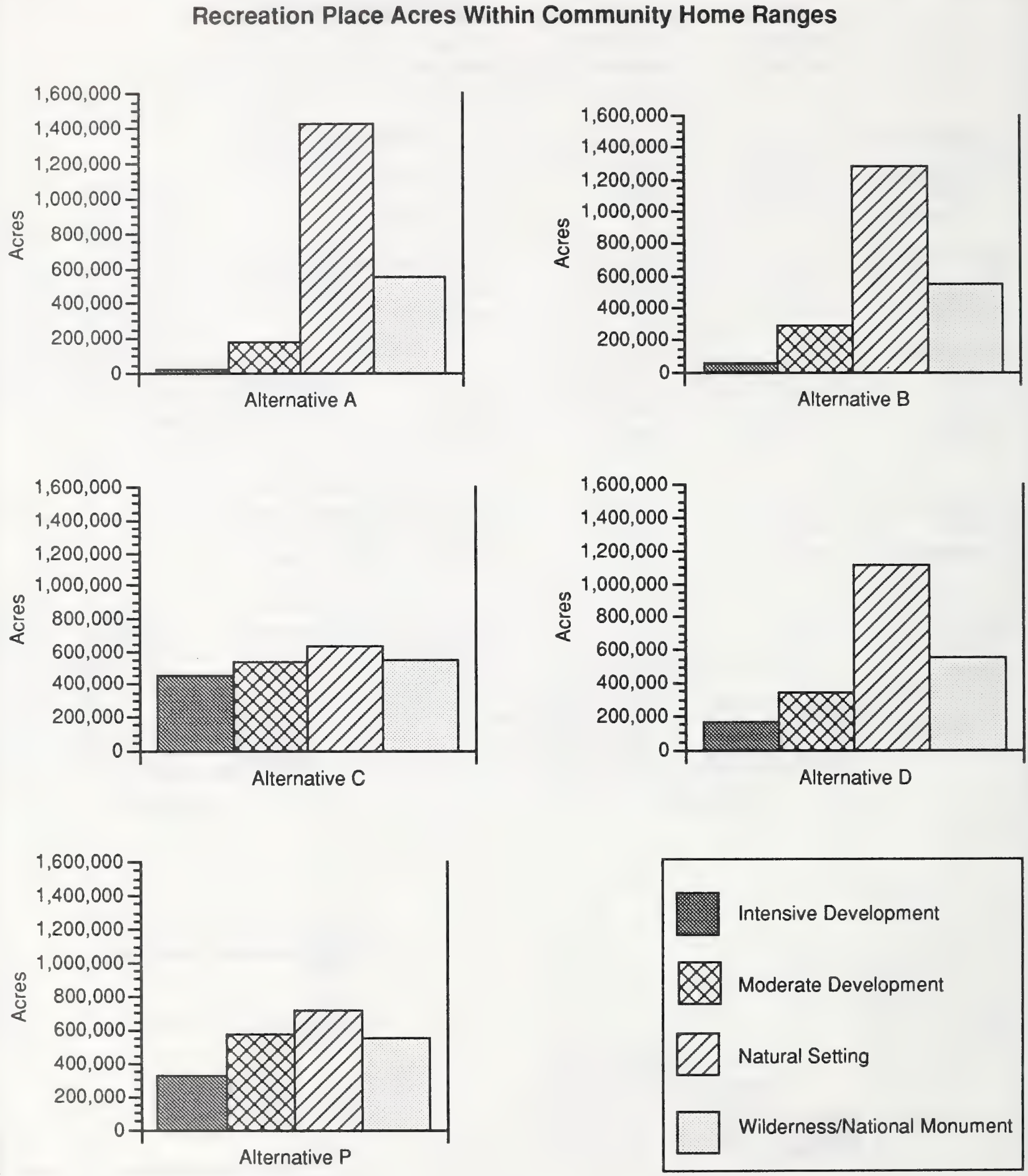
Source: Revision data base, Q249f (May 28, 1991)

Figure 3-23



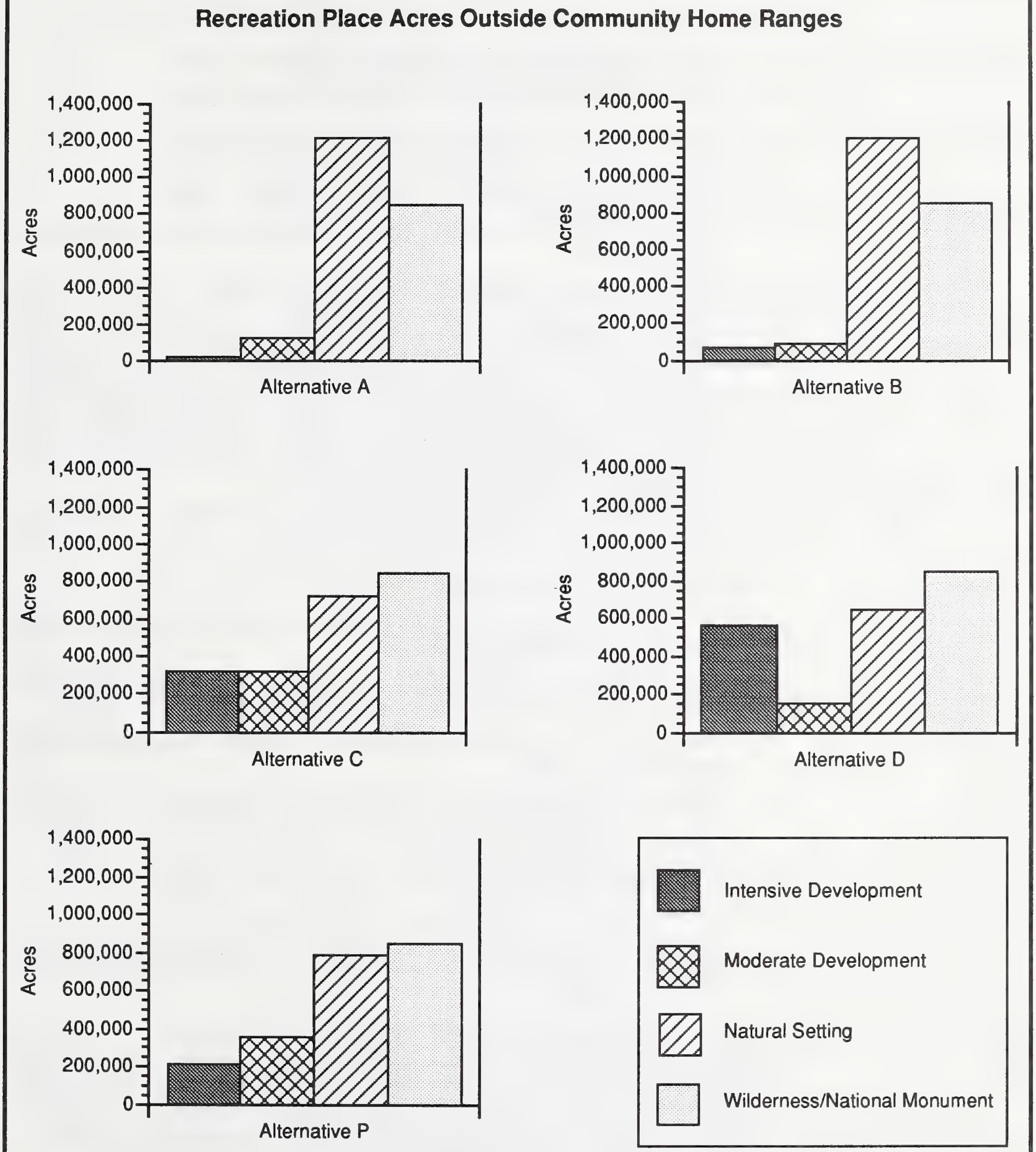
Source: Revision data base, Q249f (5/28/91)

Figure 3-24



Source: Revision data base, Q249f (5/28/91)

Figure 3-25



Source: Revision data base, Q249f (5/28/91)

The acreage of settings within designated Wilderness remains constant. Nearly 32 percent of all recreation place acres are within these areas, which includes 25 percent of recreation places within the home range.

Briefly, some of the highlights of this analysis for home range recreation places are:

- Alternative A maintains 91 percent in a natural or Wilderness condition.
- Alternative B maintains 84 percent in a natural or Wilderness condition.
- Alternative C maintains 54 percent in a natural or Wilderness condition.
- Alternative D maintains 76 percent in a natural or Wilderness condition.
- Alternative P maintains 58 percent in a natural or Wilderness condition.
- Alternatives A and B are very similar with only one percent and three percent in intensive settings respectively.
- Alternative C puts the greatest amount of home range into intensive settings, 21 percent.
- Alternative D puts only eight percent of home range recreation places into an intensive setting. This results from the goal of maintaining areas important to tourism; home-range recreation places are excluded from the suitable timber base in order to provide a degree of protection. These places were aggregated in the natural or moderate category. For those smaller places eventually surrounded by harvest activities, it is likely many would not maintain existing setting attributes. Thus Alternative D likely overstates the degree of protection for recreation places over time.
- Alternatives C and P provide the greatest mix of home range settings, with Alternative P favoring more acres in natural settings, and less in intensive.

Some of the highlights of this analysis for Forest-wide recreation places include:

- Alternatives A and B put 92 percent and 89 percent of the Forest-wide recreation places in the natural or Wilderness category.
- Alternatives C and D result in 18 percent and 17 percent of the recreation places falling into the intensive development category, while alternative P results in 12 percent.
- Alternative P has the highest percent in the moderate category compared with the other alternatives, at 21 percent.
- Alternative D likely overstates the degree of protection, as discussed in the home ranges above. In comparing the Forest-wide totals for Alternative D with the home range totals, a large amount shifts into the intensive category, beyond the home ranges, implying fewer recreation places beyond the home range are maintained in their present setting.
- All alternatives tend to place a higher percent of home range recreation places in the moderate and natural categories, than Forest-wide recreation places. This is partly due to the fact that a higher percent of recreation places outside of the home range fall into the Wilderness category.

There is an emerging concern among both land managers and some customer groups about the capacity of the recreation resource base on the Tongass. Each of the recreation places has been assigned a “theoretical capacity” based on their current ROS classification. Forest-wide this figure is 4.0 million recreation visitor days annually. These serve only as a baseline for later determinations of actual capacity limitations or opportunities. As recreation place settings become more developed, their inherent capacity generally increases, if connected to a community road system. As a recreation place setting becomes developed in a remote area, the attractiveness of the area may diminish, and the capacity may be significantly reduced.

Capacity and demand are tied to employment for each alternative, and a discussion of these impacts can be found in the social and economic section of this chapter. A summary of the capacity analysis indicates all settings except Semi-primitive Motorized appear able to supply future demand.

Impacts to recreation places are further described in terms of the values discussed previously. These include presence or high potential for facilities, tourism which includes outfitting and guiding, home ranges of specific communities, and unique marine recreation.

Community home range. Table 3-82 shows information about recreation places for specific community home ranges. Most important in this table is the amount of recreation place acres by land use designation groups. Wilderness recreation places remain constant. The table displays acres which are in natural, moderate, or intensive settings, and indicates the relative trend in the changes.

This does not imply that recreation places changing from a natural setting to a moderate or intensive setting is a negative impact. Many recreation opportunities require a higher level of development, such as campgrounds and roaded recreation activities, and thus may be viewed as an opportunity to enhance or round out recreation offerings. Some communities may be lacking developed opportunities, while others may be in need of more primitive and semi-primitive opportunities. Even within communities this perspective may differ, as one may find challenge in off-highway vehicle (OHV) use, enhanced by increased development, while another finds challenge in mountaineering, enhanced by a more natural setting. However, given the general nature of current use, marketing techniques for out-of-state visitors, resident desires, and attractions the Tongass provides, some of the natural setting changes will be viewed as a negative impact.

Table 3-82

Recreation place acres for community home ranges[1], by land use designation groups.

Community[1]	Intensive Development	Moderate Development	Natural Setting	Wilderness	Total
Alternative A					
Angoon	0	16,314	4,608	97,458	118,380
Craig-Thorne Bay	3,602	26,831	162,315	11,956	204,704
Elfin Cove-Pelican	0	0	133,023	86,600	219,624
Gustavus	440	11,216	4,021	12,059	27,735
Hobart Bay	303	59	94,735	13,039	108,136
Hoonah-Tenakee Sprs.	1,800	25,997	214,158	0	241,955
Hyder	0	0	32,808	80,530	113,338
Juneau	0	4,063	148,086	37,702	189,851
Kake	1,357	13,676	33,311	0	48,344
Ketchikan-Metlakatla-Meyers Chuck	380	11,239	172,170	15,447	199,237
Port Alexander-Walter	0	0	6,405	1,342	7,748
Petersburg	6,637	27,829	110,593	94,419	239,479
Skagway-Haines	0	0	14,057	0	14,057
Sitka	1,121	10,278	94,483	0	105,882
Wrangell	1,041	21,571	89,294	78,248	190,154
Yakutat	0	9,762	116,068	23,487	149,318
Alternative B					
Angoon	4,212	12,361	4,348	97,458	118,380
Craig-Thorne Bay	18,654	26,773	147,321	11,956	204,704
Elfin Cove-Pelican	0	18,125	114,898	86,600	219,624
Gustavus	440	11,216	4,021	12,059	27,735
Hobart Bay	1,170	867	93,060	13,039	108,136
Hoonah-Tenakee Sprs.	11,101	89,315	141,539	0	241,955
Hyder	0	0	32,808	80,530	113,338
Juneau	0	4,722	147,427	37,702	189,851
Kake	7,078	11,078	30,188	0	48,344
Ketchikan-Metlakatla -Meyers Chuck	2,939	9,921	170,929	15,447	199,237
Port Alexander-Walter	0	0	6,405	1,342	7,748
Petersburg	4,899	52,842	87,318	94,419	239,479
Skagway-Haines	0	0	14,057	0	14,057
Sitka	1,541	10,778	93,562	0	105,882
Wrangell	3,181	26,087	82,637	78,248	190,154
Yakutat	0	13,326	112,505	23,487	149,318
Alternative C					
Angoon	11,696	6,574	2,652	97,458	118,380
Craig-Thorne Bay	98,090	49,764	44,894	11,956	204,704
Elfin Cove-Pelican	16,839	22,486	93,699	86,600	219,624
Gustavus	0	14,315	1,361	12,059	27,735
Hobart Bay	45,925	41,165	8,007	13,039	108,136
Hoonah-Tenakee Sprs.	98,536	58,232	85,187	0	241,955
Hyder	8,603	20,705	3,501	80,530	113,338
Juneau	0	42,721	109,428	37,702	189,851
Kake	28,749	6,806	12,789	0	48,344
Ketchikan-Metlakatla-Meyers Chuck	43,025	66,739	74,025	15,447	199,237
Port Alexander-Walter	0	845	5,560	1,342	7,748
Petersburg	38,853	71,727	34,480	94,419	239,479
Skagway-Haines	0	0	14,057	0	14,057
Sitka	11,541	57,154	37,187	0	105,882
Wrangell	40,606	62,229	9,071	78,248	190,154
Yakutat	11,652	15,547	98,631	23,487	149,318

Table 3-82 (continued)

Community[1]	Intensive Development	Moderate Development	Natural Setting	Wilderness	Total
Alternative D					
Angoon	14,273	4,873	1,776	97,458	118,380
Craig-Thorne Bay	37,886	22,606	132,256	11,956	204,704
Elfin Cove-Pelican	0	18,926	114,097	86,600	219,624
Gustavus	0	12,055	3,620	12,059	27,735
Hobart Bay	2,077	340	92,679	13,039	108,136
Hoonah-Tenakee Sprs.	20,195	148,149	73,611	0	241,955
Hyder	40	11,862	20,906	80,530	113,338
Juneau	0	14,109	138,040	37,702	189,851
Kake	19,640	9,418	19,287	0	48,344
Ketchikan-Metlakatla-Meyers Chuck	7,762	13,543	162,484	15,447	199,237
Port Alexander-Walter	1,559	142	4,704	1,342	7,748
Petersburg	36,102	22,589	86,368	94,419	239,479
Skagway-Haines	0	2,840	11,217	0	14,057
Sitka	1,385	22,153	82,344	0	105,882
Wrangell	20,042	33,611	58,253	78,248	190,154
Yakutat	8,990	7,957	108,883	23,487	149,318
Alternative P					
Angoon	10,460	7,829	2,632	97,458	118,380
Craig-Thorne Bay	53,580	74,247	64,902	11,976	204,704
Elfin Cove-Pelican	2,383	16,262	114,358	86,620	219,624
Gustavus	0	14,315	1,361	12,059	27,735
Hobart Bay	45,945	41,165	7,986	13,039	108,136
Hoonah-Tenakee Sprs.	125,516	88,625	27,814	0	241,955
Hyder	0	29,307	3,501	80,530	113,338
Juneau	0	43,742	108,407	37,702	189,851
Kake	25,937	7,260	15,147	0	48,344
Ketchikan-Metlakatla-Meyers Chuck	29,983	68,311	85,495	15,447	199,237
Port Alexander-Walter	0	0	6,405	1,342	7,748
Petersburg	14,466	59,673	70,920	94,419	239,479
Skagway-Haines	0	0	14,057	0	14,057
Sitka	2,409	41,098	62,375	0	105,882
Wrangell	10,020	68,012	33,874	78,248	190,154
Yakutat	11,632	14,747	99,452	23,487	149,318

Source: Revision data base, Q249f (5/28/91)

[1] Many small communities, though not specifically named, fall within the home ranges listed. Home ranges include those recreation places that generally fall within a 15-mile radius of communities and their principal road systems. Where, when and how much may actually change will not be known until specific project planning is completed in accordance with implementing the revised Forest Plan.

Facilities. Table 3-83 displays the number of recreation place acres with facilities for each alternative by land use designation group. This indicates the general degree of development each alternative has on the existing recreation places that have important facilities. Depending on the attraction of a recreation place, the degree of development around a recreation place may be large, or have little impact. For instance a remote public recreation cabin may be enhanced greatly by the solitude and natural scenery the area provides. Likewise the attraction of a similar cabin might be the outstanding steelhead fishing in the spring, with the setting being only a secondary factor. To determine the impact or degree of change for a specific recreation facility, including those permitted by special use authorization, one must use the alternative map to determine which LUD the area falls within, and then refer to the management prescription for that LUD.

Table 3-83
Recreation place values, in acres, by land use designation groups.

	Intensive Development	Moderate Development	Natural Setting	Wilderness	Total [1]
Alternative A					
Facilities	12,933	136,244	889,411	662,390	1,700,978
Tourism	14,300	162,729	1,381,760	1,077,368	2,636,157
Marine	12,138	92,126	678,928	584,571	1,367,763
Alternative B					
Facilities	44,628	151,021	842,937	662,390	1,700,976
Tourism	45,894	202,855	1,310,039	1,077,368	2,636,156
Marine	28,325	98,783	656,086	584,571	1,367,765
Alternative C					
Facilities	203,472	326,019	509,094	662,390	1,700,975
Tourism	297,208	388,781	872,800	1,077,368	2,636,157
Marine	187,875	158,615	436,701	584,571	1,367,762
Alternative D					
Facilities	225,093	136,452	677,041	662,390	1,700,976
Tourism	305,159	220,685	1,032,945	1,077,368	2,636,157
Marine	250,171	106,815	426,205	584,571	1,367,762
Alternative P					
Facilities	97,581	322,308	618,697	662,390	1,700,976
Tourism	193,045	392,281	973,460	1,077,368	2,636,154
Marine	88,624	212,121	482,447	584,571	1,367,763

Source: Revision data base, Q227c (5/29/91), Q249c (May 16, 1991)

[1] Total acres do not add up due to rounding of numbers.

Currently, nearly 33 percent (416) of the recreation places with facilities account for 39 percent of all recreation place acres. Some basic findings of the table for facilities include:

- Wilderness remains constant, with 39 percent of recreation place acres with facilities.
- Alternatives A and B maintain the natural/Wilderness setting of the majority of place acres with facilities, at 91 percent and 89 percent respectively. Alternatives C and P place 69 percent and 75 percent in natural/Wilderness settings. Alternative D indicates 79 percent.
- Alternative D, the alternative which most emphasizes development, places the greatest percent of recreation place acres in the intensive grouping, at 13 percent. This alternative was designed to protect home range recreation places and thus the majority of these places in an intensive setting are those beyond the home range.
- Alternative D may be overstating the case in the natural category. Places in the home range are protected, but as the surrounding setting is developed, the area may not be of sufficient size to maintain all of its current setting attributes.

- Alternatives C and P place the greatest amount, 19 percent each, in the moderate group, indicating a mix of developed, accessible, yet somewhat natural opportunities.

Tourism. Table 3-83 also displays the relative amount of recreation place acres important to the tourism industry that will change over time by alternative, from natural to more developed LUD groups. Again these changes may be viewed as opportunities as well as determents for the industry. However, based on numerous surveys and marketing campaigns for visitors, it is widely accepted that natural beauty and scenery are one of the principle ingredients to the industry.

Currently, nearly 44 percent (560) of the recreation places important to tourism account for 60 percent of all recreation place acres. This suggests that tourism in the forest encompasses vast areas, consistent with the values of scenery, wildlife, remoteness and solitude. A brief summary of the table indicates:

- Wilderness remains constant accounting for 41 percent of the recreation place acres important to tourism.
- Alternatives A and B maintain the greatest amount of settings of recreation places valued for tourism in a natural or Wilderness condition, at 93 percent and 91 percent respectively. Alternatives C and P have 74 percent and 78 percent in these settings, and alternative D has 80 percent in these settings.
- Alternative C and D result in the greatest percent of setting acres in the intensive development category, at 11 percent and 12 percent respectively.
- Alternative D protects home range recreation places, and thus the majority of the acres in the intensive setting are beyond the home range. The degree of naturalness for the home range recreation places may be overstated over time.

Marine. Table 3-83 displays marine recreation as well. Many of these places will be maintained to some degree, due to the retention of beach fringe in Alternatives A,B,C and P. Again, the perceptions of naturalness and scenery are high values amongst Forest visitors engaged in the unique marine recreation opportunities the Forest provides.

Currently, over 42 percent (539) of the recreation places, accounting for only 31 percent of the recreation place acres, are inventoried as being important to marine recreation. This suggests the narrow beach fringe area is used more frequently then inland areas. This area generally represents a Semi-primitive Motorized ROS setting, and thus relies heavily on the natural and Wilderness groupings to maintain these setting attributes. A quick look at the table indicates:

- Wilderness remains constant with 43 percent of recreation place acres important to marine recreation.
- Alternative A maintains 92 percent of important marine recreation place acres in a natural or Wilderness setting, Alternative B — 91 percent; Alternative P — 78 percent; Alternative C — 75 percent; and Alternative D — 74 percent.
- Alternative D puts the greatest acreage into an intensive setting, at 18 percent, despite protection of these places within the home range. This partially reflects the distribution of important marine recreation places, which are spread out more evenly beyond the home range. Even those within the home range may not maintain all the current setting attributes over time.
- Alternative P has the greatest percent of acres in the moderate grouping at 16 percent and only 7 percent in the intensive grouping, indicting a higher level of protection than Alternatives C and D, which are weighted the other way around.

It is important to recognize that the changes just described will occur over time. Management strategies may change in the next planning period if public needs and wants change. Changes to the recreation resource will generally be incremental over time, and each project proposal will focus on site-specific issues and opportunities.

The rate of change can be correlated with the planned road construction activity for the various alternatives. In the first decade, Alternative A constructs the least, at about 1,350 miles, and Alternative D the most, at 2,235 miles. By the end of the second decade, all alternatives would have had about 50 percent of the planned roads constructed. By the end of the eighth decade, nearly all of the road mileage planned for in an alternative will have been constructed.

Use and Demand

Trends in recreation use and visitation discussed previously in this section indicate rapid growth in the past few years. This growth includes the number of arrivals, the modes of transportation, and the different types of activities participated in. Past and current studies indicate the main attractions for recreationists include scenery, wildlife, feelings of remoteness, and a sense of vastness. These trends are likely to continue. The marine and undeveloped character of the Forest plays an important role in attracting recreationists and in meeting their expectations.

As the forest changes over time, so may the makeup of Forest visitors and the activities they engage in. As the complexion of the forest setting and associated recreation places changes, recreationists will have three general options. Many will adapt to the new situations. Setting changes and changes in the character of other recreationists will have little or no impact to many of the current forest users. For some, the changing scenario may not be acceptable, and these users will be displaced to other areas where the setting and use patterns are more in line with their expectations and needs. Others may find they can neither adapt to the new situation nor find areas to be displaced to, and thus may substitute their leisure time with other activities.

The projected use and capacity analysis found in the social and economics section of this chapter indicates several trends. The largest use, and fastest growing opportunities are those associated with Semi-primitive Motorized ROS class setting. The second largest and growing component of use are the Primitive and Semi-primitive Nonmotorized settings. The smallest use, but one which is also growing, are opportunities associated with Roaded settings.

Setting changes are generally recognized as a one way street, moving toward the developed end of the ROS spectrum, though given enough time in this rainforest, settings can revert back to semi-primtive conditions. The analysis indicates that, as the forest is developed over the next decade, an over-supply of roaded settings will exist. At the same time the Forest is large enough that an adequate supply of Primitive and Semi-primitive Nonmotorized settings will remain. However, projected use indicates that Semi-primitive Motorized settings, characteristic of the marine interface, will reach capacity within the decade.

These demand findings are consistent with the nature of recreationists discussed previously. The lifestyle and recreation activities of local residents is tied directly to the natural marine setting Southeast Alaska offers.

Tourism is also tied directly to the natural scenery, vastness, and remoteness of the area. Some of the tourism opportunities from cruiseships and the like, will remain unaffected as long as scenery along critical travel routes remains natural appearing. The adventure traveler requires quality-based opportunities, and will compete for capacity of certain settings as the Forest changes over time. Certain segments of recreationists, such as OHV users, will find activities enhanced as the Forest is developed over time, while others will find opportunities lessened.

As use and demand increase over time, more competition for resources will occur. For some of these resources, such as fishing, substitute opportunities may be present in a different area, or the change in settings may make little difference as long as the sought-after resource is in ample supply. For other resources, such as solitude, there may be no substitute.

Social encounters will also increase over time. This may not have a great impact in modified settings. The impact will be felt the most in the undeveloped settings, especially in those alternatives which reduce them the most. As primitive and semi-primitive settings are reduced, conflicts between users will likely increase as well; the degree being relative to the amount of change in the alternatives. This conflict may be between user groups engaged in different activities, such as motorized versus non-motorized, or between residents and tourists vying for the same unique opportunities with few substitutes, such as bear viewing areas.

One result of shortages in Semi-primitive Motorized settings may be greater pressure on Wilderness, LUD II, and Monument areas. Some of these areas are already at or near capacity, while some are virtually unused. Thus a distribution factor comes into play. Those that are already heavily used generally have some attraction, such as a unique opportunity or easy access within a home range. Those that are not are generally difficult to access, or contain few attractions. Heavier use in some of the areas may bring about increased restrictions on user numbers or the activities they engage in. This problem of distribution could be somewhat resolved by identifying substitute opportunities, or new ventures for outfitters, guides, and providers of transportation services.

Effects by Alternative

The alternatives are now compared. It will compare the nature of recreation settings for each alternative, relative to previous discussions on forest recreationists and the supply of recreation opportunities. The change in these settings is correlated with projected road construction for the next eight decades, at which time nearly all projected roads will have been constructed.

Alternative A

This alternative provides the greatest amount of Primitive and Semi-primitive recreation opportunities both Forest-wide and within community home ranges. Conversely, it provides the least amount of road-accessible recreation opportunities. This alternative most closely maintains the current outdoor recreation setting conditions Forest-wide. Residents and visitors would essentially maintain existing use patterns and opportunities.

Just over 17 percent of the Forest would eventually shift toward the developed end of the opportunity spectrum, while less than one percent of the recreation place acres would be affected. Places identified as important would be maintained in natural and Wilderness settings in this alternative, at over 90 percent of existing acres.

Approximately 1,350 miles of new roads would be scheduled for construction during the next decade, and over 5,150 miles in the next eight decades. Little of the timber harvest associated with these roads would occur in recreation places.

Alternative B

This alternative provides nearly the same proportion of natural setting opportunities as Alternative A, in all recreation places Forest-wide. The principal difference is that there would be some recreation places with moderate activity around them, and thus a slight increase in road-accessible opportunities over Alternative A. Existing recreation use patterns would continue with only slight localized changes, and possibly new roaded opportunities.

Over 21 percent of the Forest would eventually shift to the developed end of the opportunity spectrum, while less than 3 percent of the recreation place acres would be affected. Places with high values would remain in natural and Wilderness settings, at around 90 percent of the acres.

Implementation would schedule approximately 6,520 miles of road to be constructed during the next eight decades, with 24 percent (1,575 miles) being scheduled in the first decade. Nearly all these roads and affected acres would be outside recreation places.

Alternative C

This alternative has the greatest effect on shifting undeveloped recreation places and opportunity settings toward the developed end of the spectrum. Over time, the alternative could provide the greatest amount of road-accessed recreation in Roaded Natural or (mostly) Roaded Modified recreation opportunity classes. Conversely, the least amount of Primitive and Semi-primitive recreation settings, outside designated Wilderness, will be available. All settings outside Wilderness will be relatively balanced in terms of acreage, but natural settings may be perceived as more crowded as they become less abundant, and use increases. Over time, this alternative would result in the greatest change to current recreation use patterns for both residents and tourism alike.

Over 30 percent of the Forest would eventually shift to the developed end of the opportunity spectrum, affecting 21 percent of recreation place acres in the home range, and nearly 18 percent Forest-wide. Nearly 62 percent of the recreation place acres Forest-wide would still remain in a natural/Wilderness condition. Around 12 percent of the recreation place acres with high values would be affected, somewhat similar to Alternative D.

During implementation of this alternative approximately 8,825 miles of new roads would be constructed during the next eight decades, with 25 percent (2,207 miles) being built in the first decade. All recreation places with suitable timber scheduled for harvest would be in a roaded condition and capable of providing roaded recreation opportunities by the end of the eighth decade.

Alternative D

In this alternative a similar amount of opportunity settings would shift toward the developed end of the spectrum as in Alternative C. Over time, this alternative would provide the greatest amount of road mileage, providing numerous opportunities for roaded forms of recreation. The major difference between this alternative and Alternative C is that home range recreation places would remain predominantly natural-appearing, with only about eight percent falling into the developed end of the opportunity spectrum. Forest-wide however, nearly the same amount of recreation place acres would fall into the developed end of the spectrum over time. Implications for recreationists are better maintenance of existing home range settings than Alternatives C and P, favoring both residents and tourists alike, and considerable change in settings beyond the home range. This will impact certain types of activities such as extended outings, and those requiring a high level of remoteness.

Nearly 29 percent of the Forest would eventually take on the character of the developed end of the spectrum, affecting eight percent of the home range recreation place acres and nearly 17 percent of the acres Forest-wide. Recreation places with high values would have a similar percent of acres in intensive development settings similar to Alternative C, except marine recreation places would be somewhat more protected in Alternative D, at 18 percent versus 14 percent. In addition, Alternative D protects the settings of home range recreation place acres, resulting in a greater percent toward the semi-primitive end of the spectrum, than in Alternative C. While it is acknowledged this protection of home range places may not be of sufficient

scale to maintain all of the existing setting attributes, it is clear they maintain the settings at a higher level than Alternative C.

Timber harvest would require about 9,050 miles of new roads over the next eight decades, with 25 percent (2,235 miles) scheduled during the first decade. Numerous recreation places protected under this alternative might still be road-accessible or within the vicinity of roads. The principal difference, in Alternative D as compared to C, is that home range recreation places are allocated to land use designations which emphasize recreation values and would not be subject to harvest. Recreation places outside home ranges, with suitable timber acreage, and located in current harvest allocations, are all scheduled for harvest sometime in the next eight decades.

Alternative P

Much of the Forest setting would shift toward the developed end of the opportunity spectrum in this alternative, though not as much as in Alternatives C and D. Recreation place acres change in this direction as well, though not as much as in Alternative C. Compared to Alternative D, home range recreation places change settings more in Alternative P, but Forest-wide, the change is less. In addition Alternative P has a greater percent of acres in the middle of the spectrum, the moderate grouping, than Alternatives C and D.

Over time, 27 percent of the Forest will take on settings in the developed end of the opportunity spectrum, affecting 15 percent of the home range place acres, and 12 percent Forest-wide. Recreation places with important values would be maintained to a much greater degree than Alternative C and D, though not as much as in Alternatives A and B. Thus existing recreation users would not be impacted in this alternative to the degree of change experienced in Alternatives C and D.

Implementation of this alternative would result in a total of 7,990 miles of road constructed over the next eight decades, with 2,010 occurring in the first decade. Since a higher percent of recreation place acres exist in the moderate settings in this alternative than others, a certain degree of roading could occur within the vicinity of these recreation places.

Summary

Over time, the Forest will continue to shift toward the developed end of the recreation opportunity spectrum, bringing about increased opportunities associated with roads, and decreased opportunities associated with primitive forms of recreation. The degree of change varies by alternative. Alternatives A and B are very similar, and appear best in maintaining the current character of recreation opportunities. Alternatives C and D shift much of the character into intensive, developed settings, except that Alternative D protects recreation places within the home range. Alternative P has a similar shift in character as Alternatives C and D, except a higher proportion of the change is in the moderate or transition settings rather than the more developed settings.

It appears the Forest has an ample supply of settings in most opportunity classes to meet demand in the first decade. However, projected demand indicates the Semi-primitive Motorized opportunity class will be in short supply within the decade. This setting typifies the unique character of recreation in Southeast Alaska, that of a marine or fly-in nature to relatively remote areas.

Despite the change in settings to more modification, the Forest still maintains 40 percent of the recreation place acres in areas protected through legislation in all alternatives. Important recreation places Forest-wide, also receive a higher degree of protection than recreation places in general.

Marketing of the unique recreation opportunities on the Tongass and Southeast Alaska, is already capturing new market segments. Recent increase in activities such as non-consumptive uses of wildlife, kayaking, and cruiseship arrivals, suggest the trend will continue. One aspect of marketing is the recognition of changing preferences, as well as identifying new market segments. This will become more important as the character of the Forest changes over time.

Mitigation

The management prescriptions for several land use designations are specifically designed to provide areas where primitive and semi-primitive types of recreation may occur (see Proposed Revised Forest Plan, Chapter 3). Each prescription is designed to meet the objectives of one or more Recreation Opportunity Setting class. Each management prescription contains direction to manage the recreation settings to the standards established for their respective ROS classifications, and the purposes called for in the prescription. Standards and guidelines within the prescriptions, as well as the Forest-wide Standards and Guidelines (Proposed Revised Forest Plan, Chapter 4) will be applied to ensure that appropriate recreation settings and opportunities are providing for a wide range of uses and activities. Standards and guidelines are also applied to developed sites (cabins, campgrounds), trails and other areas to provide opportunities for high-quality recreation experiences.

Some recreation place settings will change over time. For those that do, the recreation settings will always be managed to meet the established standards and guidelines for the resulting ROS classification. As authorized projects are implemented, the changes in current conditions in recreation places will be recorded, and inventory records periodically updated.

Research Natural Areas

Affected Environment

Background

Research Natural Areas (RNA's) are part of a national network of field ecological areas designated for research and education and/or to maintain biological diversity on National Forest System lands. Research Natural Areas are used for non-manipulative research, observation, and study. They also may serve to carry out provisions of special acts, such as the Endangered Species Act and the monitoring provisions of the National Forest Management Act.

Existing RNA's

Currently six Research Natural Areas are established on the Tongass National Forest. Figure 3-26 shows the location of these areas. The following narrative provides a brief description for each.

Pack Creek RNA. Established in 1951; size - 5,837 acres; located on Admiralty Island. This RNA was established to represent old-growth spruce/hemlock forest types in northern Southeast Alaska, and to represent productive coastal brown bear habitat. The Pack Creek RNA includes excellent examples of diverse alpine meadows, rockfalls, and snowfields representative of much of northern Admiralty Island.

Cape Fanshaw RNA. Established in 1965; size - 614 acres; located at the junction of Frederick Sound and Stephens Passage. This area was established to represent undisturbed old-growth Alaska yellow-cedar and western hemlock forests. It represents a good example of cedar decline on the mainland, and has been used for long-term monitoring of changes in species composition and stand dynamics.

Red River RNA. Established in 1980; size - 8,031 acres; located in Misty Fiords Monument Wilderness. This RNA represents the northern range of silver fir (*Abies amabilis*).

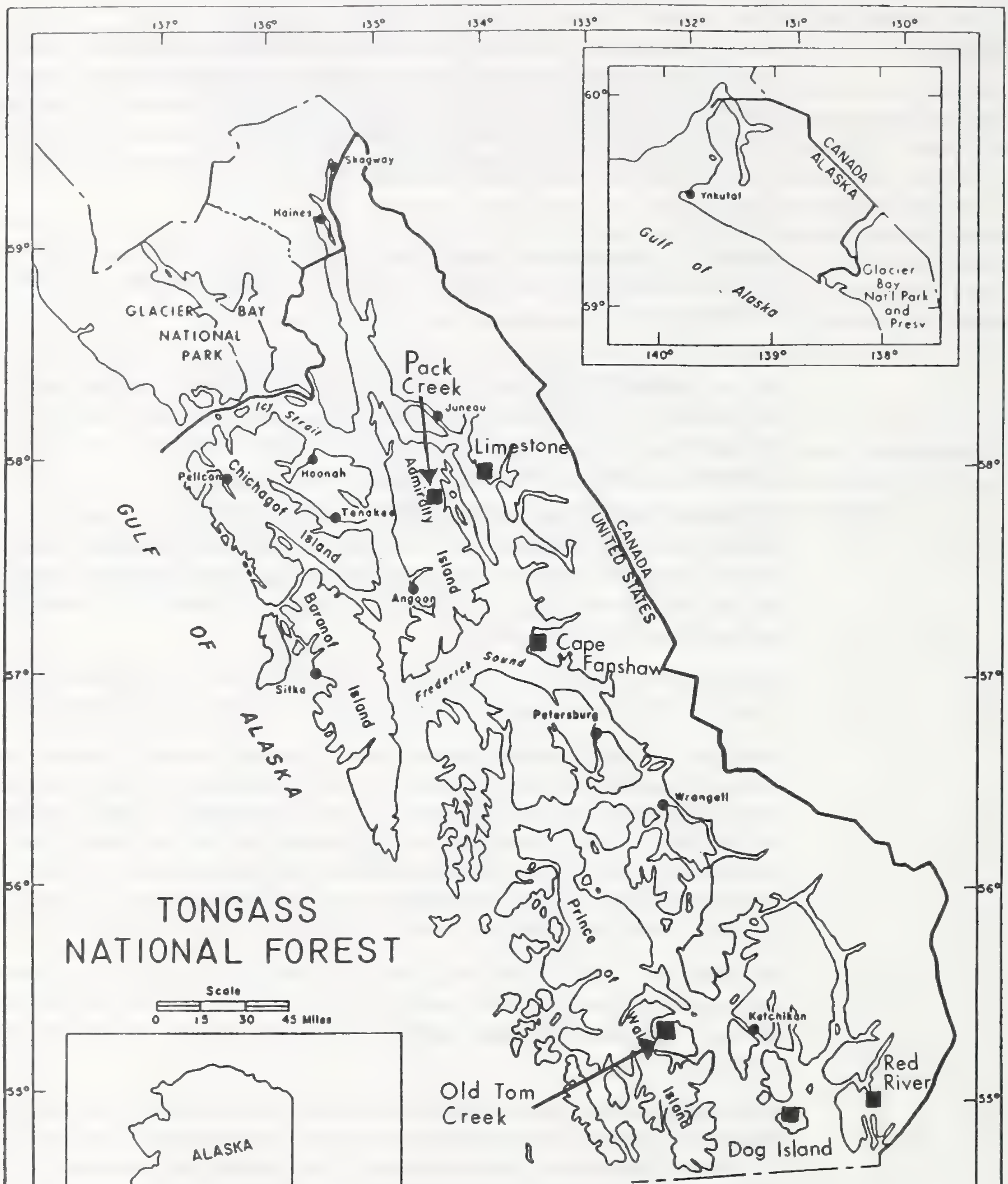
Limestone Inlet RNA. Established in 1951; size - 6,399 acres; located in Stephens Passage. This area represents typical vegetation types common to the Juneau mainland, including many avalanche chutes and a mainland stream with a good fish population. In 1951, Limestone Inlet was considered the most pristine drainage in the northern mainland coast, making it an excellent area for documenting baseline conditions on the mainland. However, Alaska Department of Fish and Game has altered the native salmon runs since 1980 by operating a hatchery in nearby Snettisham Lake, although upland areas still remain intact.

Dog Island RNA. Established in 1976; size - 705 acres; located on Dog Island. This RNA represents a small island ecosystem containing the northern limit of Pacific yew (*Taxus brevifolia*), associated scrub timber and low volume mixed conifer sites of southern Southeast Alaska.

Old Tom Creek RNA. Established in 1951; size - 4,544 acres; located on central Prince of Wales Island. Situated in a low-site, cedar-dominated watershed, this RNA was established as an example of cedar-hemlock old-growth forest. It also includes some examples of riparian spruce forest, extensive tidal meadows, and dense bald eagle and black bear populations.

Figure 3-27

Location of Research Natural Areas



Changes Since the DEIS

Additional field work was conducted during 1990 to re-evaluate several of the RNA proposals in the DEIS. Several new RNA proposals were also suggested by Forest Service personnel and these new areas were evaluated for their suitability as potential RNA's. All of the RNA proposals were evaluated by the RNA Steering Committee in light of the Tongass Timber Reform Act. As a result of this work, the RNA Steering Committee submitted the following recommended changes in RNA proposals to the Forest Service.

New RNA Proposals

Tonalite Creek
Rio Roberts
Klakas Lake

RNA Proposals Modified (boundary adjustments) from the DEIS

Mount Calder-Virginia Mountain
Upper Tenakee Hot Springs

RNA Proposals No Longer Recommended

Disappearance Creek
Johnson Lake
Chaik Bay
Port Camden Fossil

Each Administrative Area of the Tongass National Forest reviewed all of the RNA Steering Committee proposals. During this review, additional resource information was evaluated, such as the amount of recreation use, possible power withdrawals, transportation needs, minerals activity, and timber resources. As a result of this review, 18 RNA proposals are considered and evaluated among various alternatives. The Forest Service also reviewed resource uses occurring in the six existing RNA's, and proposed delisting Pack Creek as an RNA, but replacing it with the Swan Cove RNA proposal.

Methodology Used to Identify New Potential RNA Proposals

The Alaska Regional Guide (USDA Forest Service, 1983) identified plant communities, shrub species, geologic landforms, and animal species to be included within a network of RNA's in Southeast Alaska. To date, not all the needed ecosystems identified in the Regional Guide have been included in RNA's on the Tongass National Forest. National Forest Management Act Regulations provide the following direction for RNA's: "Forest planning shall provide for the establishment of RNA's. Planning shall make provision for the identification of examples of important forest, shrubland, grassland, alpine, aquatic, and geologic types that have special and unique characteristics of scientific interest and importance...and that are needed to complete the National network of RNA's."

In response to this planning direction, a Research Natural Areas Steering Committee was organized which included individuals from the Tongass Land Management Planning Team, the Forestry Sciences Lab in Juneau, and the University of Alaska Ecological Reserves Program. This RNA Steering Committee organized an RNA Workshop involving natural resource scientists and managers familiar with Southeast Alaska. The workshop had two primary objectives:

Workshop Objective 1

The first objective was to identify the basic units (cells) which should be represented in a Research Natural Area system on the Tongass National Forest. Another way of stating this is: "What kinds of ecosystems and unique features should be represented within Research Natural Areas in Southeast Alaska?" The ecosystems and features identified in the Regional Guide

were reviewed and refined by the workshop participants incorporating new information such as the recent plant association classification developed for the Tongass National Forest. Seven geographic provinces were described for the Tongass. Table 3-84 and Figure 3-27 describe and display these provinces.

In accomplishing Objective 1, workshop participants identified cell types (ecosystems and/or unique features) needing representation in RNA's in Southeast Alaska. The cell type needs included: vegetation cells, aquatic cells, and wildlife cells. Geology cells were incorporated with the vegetation and aquatic cells. A summary of the vegetation, wildlife, and aquatic cell type needs identified at the workshop is presented in Tables 3-85 through 3-87. A more complete discussion of these cell type needs is presented in the planning record report titled: *Research Natural Area Proposals for the Tongass Forest Plan Revision - Results of Research Natural Area Workshops, May 24 & 25 and July 21, 1988*, by Juday, et al., 1988. Additional information is also presented in the Analysis of the Management Situation, Tongass National Forest, 1990.

Table 3-84

Geographic Provinces

Geographic Province	Description
Yakutat Forelands	Includes Glacier Bay north to Yakutat Bay. Recently uplifted beaches and active fluvial processes related to icefields, valley glaciers, and cold wet climate distinguish this region from the rest of Southeast Alaska.
Lynn Canal	The driest and one of the most continental environments in Southeast Alaska. Extreme rain shadow from the Chilkat and St. Elias Ranges allows extensive development of fire-dependent forests (lodgepole and birch), and the southern and westward extension of boreal forest and tundra plant species. Rugged scoured terrain with large vertical relief.
Coast Range	Rugged heavily glaciated terrain with extensive alpine and icefield environments. Productive forest land usually confined to river valleys and marine terraces. British Columbia batholith has major influence over the whole area. This province may be logically divided into two subzones, perhaps divided at the Bradfield Canal with more extensive alpine and active glaciation to the north and less extensive ice to the south.
Northern Outer Islands	Rugged highly dissected topography exposed extremely wet outer coastal environment, and extensive alpine environments with productive forested areas highly fragmented and usually concentrated on oversteepened slopes and on valley bottoms.
Northern Interior Islands	Includes eastern Chichagof and Admiralty Islands. Protected from full force of storms off the outer coast, but with colder climate and more rugged topography than in the Central Interior Islands province. Also, with distinctive fauna. Originally considered to be a subprovince of the Northern Outer Islands, but because of its contrast in climate and geology with the outer coast and Baranof Island, it was redefined as its own province.
Central Interior Islands	Includes Kupreanof Island lowlands and surrounding areas protected from storms off of the outer coast and generally moderate in precipitation and temperature extremes. Includes several major rain shadow areas such as northwest Kupreanof and parts of Etolin Island. Generally subdued rolling topography and extensive muskeg areas.
Southern Outer Islands	Rolling subdued topography to north and localized rugged topography to the south. Includes many refugia, unique plant and animal populations at the northern extent of their natural range, and highly productive forests, especially on limestone and marble soils derived from ancient coral reefs.

Figure 3-27

Geographic Provinces of Southeast Alaska

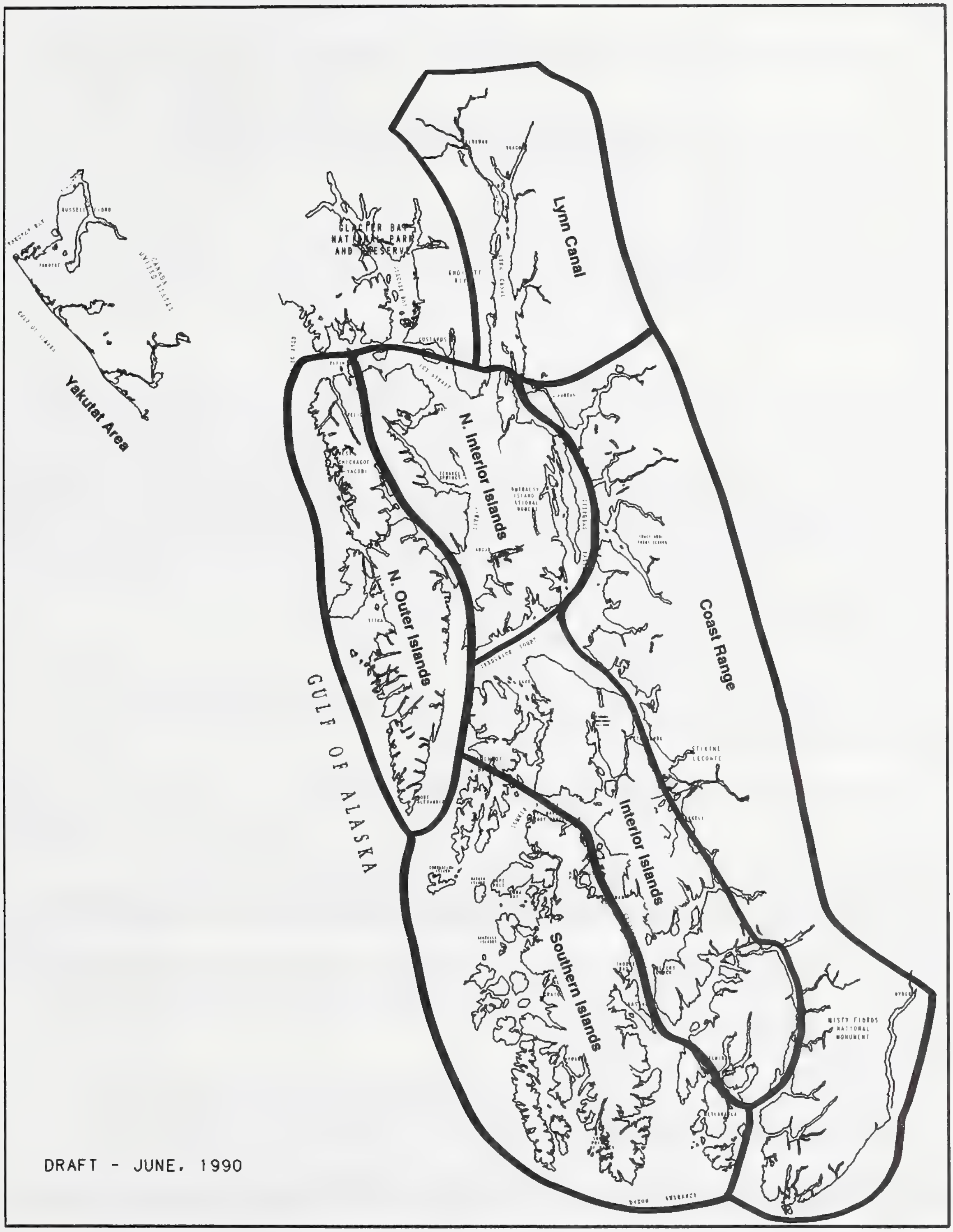


Table 3-85

Vegetation cell types recommended to be represented in RNA's in Southeast Alaska

Yakutat Geographic Province

Typical features

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Sitka spruce-cottonwood forests on recent uplifted beach soils and in association with active floodplains (alder, willow, and devil's club understories).
5. Glacial outwash meadows with sandy beach deposits.
6. Willow dominated brush fields.

Special types

7. Disjunct populations of shore pine and associated muskeg features.
8. Post-glaciation successional types, including sea level valley glaciers as well as ice-dammed areas.

Lynn Canal Geographic Province

Typical features

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Sitka spruce-cottonwood floodplain and marine terrace forests (alder, willow, devil's club understories).

Special types

7. Lodgepole pine forests of fire origin.
8. High elevation subalpine fir forests at northwest extent of natural range.
9. Sitka spruce-sweet gale in protected coves.
10. Isolated nunatak floras.
11. Southern and western extent of range of various alpine and forest plant species near Canadian border.

Coast Range Geographic Province

Typical features

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories).

Special types

7. Recent lava flow successional types.
8. Pacific silver-fir at northern extent of range.
9. Swordfern, and salal at northern extent of range.
10. Large river gorges with more continental climate and isolated populations of boreal plant species.

Northern Outer Islands Geographic Province

Typical features

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Table 3-85 (continued)

Special types

6. Exposed outer coast Sitka spruce-Pacific reedgrass beach forests.
7. Sitka spruce-sweet gale in protected coves.
8. Recent volcanic ash successional types.
9. Extensive ice retreat-glacial successional types.

Northern Interior Islands Geographic Province

Typical features

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Special types

6. Hot springs.

Central Interior Islands Geographic Province

Typical features

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories).

Special types

7. Beach Sitka spruce-false lily-of-the-valley forest.
8. Northern extent of range of western redcedar.
9. Northern extent of range of swordfern, salal.
10. Highly productive mature old-growth even-aged forests of fire origin in rain shadow areas (western hemlock series with blueberry understory).
11. Productive Sitka spruce-devil's club-enchanter's nightshade on active loess soils.
12. Hot springs.

Southern Outer Islands Geographic Province

Typical features

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories).
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories).
3. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories).
4. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Special types

6. Exposed outer coast Sitka spruce-Pacific reedgrass, meadow rue, beach forests.
7. Productive mature even-aged forests (blueberry-shield fern associations, 150-300 years old).
8. Productive old-growth forests on gentle topography, limestone-marble soils derived from ancient coral reefs.
9. Sitka spruce-sweet gale in protected coves.
10. Glacial refugia with disjunct populations of subalpine fir.(Glacial refugia are areas not glaciated during the last glacial period).
11. Glacial refugia and disjunct populations of alpine plant species with some at their northern extent of range.
12. Northern extent of range for Pacific yew and associated species.
13. Hemlock series forests and meadow vegetation on ultramafic bedrock types.

Source: Juday, et al., 1988, and RNA Steering Committee.

Table 3-86

Eight General Wildlife Habitats recommended as cell type needs for RNA's on the Tongass National Forest

1. Old-growth riparian spruce habitat which would provide cell needs for riparian-associated wildlife such as black bear, brown bear, river otter, bald eagle, common merganser, and pine marten.
2. A range of high to low volume old-growth upland hemlock/spruce habitats which would provide cell needs for deer, pine marten, blue grouse, wolf, cavity-nesting species, mountain goats (rocky, low elevation winter), and goose.
3. Alpine/subalpine habitats which would provide cell needs for deer (summer), mountain goats, blue grouse, wolf.
4. Wetland habitats which would provide cell needs for swans, geese, other waterfowl and shorebirds.
5. Beach fringe habitats which would provide cell needs for eagles, otter, black and brown bears, deer (winter), and marten (summer and winter).
6. Estuary habitats which would provide cell needs for black and brown bears, geese, common merganser, other waterfowl and shorebirds.
7. Deciduous shrub habitats which would provide cell needs for moose and wolf.
8. Isolated small islands which would represent small mammal island biogeography effects.

Source: Juday, et al., 1988.

Table 3-87

General Watershed Cell Types recommended for RNA's on the Tongass National Forest

General Watershed Cell Type	Characteristics Which Could Be Associated with Each General Cell Type
Glacial (active) – Outwash Plain Watersheds	Typically found in geographic province 1 (Yakutat)
Glacial (active) – Mainland Valley Watersheds	Typically found in geographic provinces 1 (Yakutat), 3 (Northern Interior Islands) and 4 (Lynn Canal)
Alluvial "U" Shaped Valley Watershed	Typically found in geographic provinces 2 (Northern Outer Islands), 4 (Lynn Canal), and 5 (Coast Range) Spruce riparian communities in valley bottoms with Steep Side Slopes Small (e.g. Limestone), medium (e.g. Gambier), and large (e.g. Kadashan) systems, although there can be considerable differences between them Bedrock control on mountainslopes, alluvium on valley bottoms
Rock Basin Lake System Watersheds	Typically found in geographic provinces 2 (Northern Outer Islands) and 4 (Lynn Canal) High scour Scooped out of bedrock Originally glacially formed Bedrock control, numerous control (nick) points Range from small to large systems Process groups: contained mountainslope, moderate contained
Steep Streams Terminating in Salt Water	Typically found in all geographic provinces Various substrates (Sizes of rock in the stream or river bed (bottom) Typically bedrock control, although sometimes large rock
Alluvial – Low Overall Gradient, Rolling Topography Watersheds	Typically found in geographic provinces 5 (Coast Range), and 6 (Central Interior Islands) and small parts of 2 (Northern Outer Islands) Mixed controls (stream channel controls) Various bedrock Mixed vegetation Low gradient alluviums Some watersheds with lakes, some without
Raised Marine Terraces with Marine Clays	Parts of Kupreanof Island, west side of Duncan Canal (could be a small watershed), maybe a tributary to Iyoutuk, maybe somewhere on North Chichagof

Source: Juday, et al., 1988.

Workshop Objective 2

The second objective was to recommend potential areas on the Tongass National Forest which represent the cells (ecosystems) for RNA designation. To accomplish Objective 2, workshop participants identified over 60 potential candidate areas on the Tongass National Forest which could represent the vegetation, wildlife, and aquatic cell type needs (Juday, et al., 1988). The RNA steering committee evaluated these 60 proposed areas using the following steps:

1. Each of the areas was evaluated using criteria developed at the RNA workshops and the direction for RNA's in the Regional Guide.

2. Field trips were made to many of the potential candidate RNA's to gain on-the-ground knowledge. Information from these field trips, additional study of available scientific and resource information, and written comments from scientists and resource specialists unable to attend the workshops, resulted in some new potential candidate RNA's and changes in ranking.

3. Glenn Juday studied herbarium and other collection information to define uncommon plants for Southeast Alaska, and used this information as an additional criterion to evaluate potential candidate RNA's.

4. During 1990, additional field work was conducted by the RNA Steering Committee to re-evaluate several of the RNA proposals in the DEIS. Also, several new RNA proposals were suggested by Forest Service personnel and these new areas were evaluated for their suitability as potential RNA's. All of the RNA proposals were evaluated by the RNA Steering Committee in light of the Tongass Timber Reform Act. As a result of this work, the RNA Steering Committee submitted 30 priority potential RNA proposals to the Forest Service (Table 3-88). Descriptions for each of the 30 RNA proposals are provided in Appendix D.

The Tongass Administrative Areas and Ranger Districts subsequently reviewed the 30 priority potential RNA proposals with additional resource information for minerals, timber, State and Native land selections, fish improvement projects, developed and undeveloped recreation uses, existing and likely future transportation needs, and other pertinent information affecting the suitability of each area for consideration as an RNA (Table 3-88). The Forest Supervisors and District Rangers then selected the RNA proposals to be considered among the alternatives developed for the Revision; 18 were selected (Table 3-89). Two to four priority potential RNA's are proposed in each geographic province so that typical and/or unique cell types of each region are adequately represented (Figure 3-28). Rationale for not selecting 12 of the priority potential RNA proposals is given in Appendix D.

Table 3-88

Existing LUD Allocations and other natural resources and uses associated with the priority potential RNA proposals from the RNA Steering Committee

Geographic Province RNA Proposal	LUD[1]	Total Acres	Tentatively Suitable Acres[2]	High Minerals Potential	Potential Transportation Conflicts	Identified Recreation Place	Other Uses and Other Recreation	Special Area Consideration
Yakutat Forelands								
Akwe Beach	CLII	11,032	561	No	No	Yes	Yes[3]	No
Akwe-Ustay Lakes	II	9,786	504	No	No	No	No	No
Mountain Lake	I/W	5,425	0	No	No	No	No	No
Pike Lakes	IV	1,822	380	No	No	No	Yes[4]	Yes
Upper Situk	II	2,723	961	No	No	Yes	Yes[5]	No
Lynn Canal								
Warm Pass	II	10,560	60	No	No	Yes	No	No
Dayebas Creek	II	8,724	640	No	Yes	No	Yes[6]	No
Coast Range								
Blue Lake Lava	I/MW	19,323	0	No	No	Yes	No	Yes
Martin River	I/MW	6,213	0	No	No	No	No	No
Robinson Lake	I/MW	4,297	0	No	No	No	No	No
Twin Lakes	I/W	7,202	0	No	Yes	Yes	No	No
Northern Outer Islands								
Crater Ridge-Freds Creek	III	8,630	761	No	No	No	Yes[7]	Yes
Myriad Islands	I/W	302	0	No	No	No	No	No
Plotnikof-Port Banks	I/W	16,723	0	No	No	Yes	No	No
Northern Interior Islands								
Gambier Bay	I/MW	4,777	0	No	No	Yes	No	No
Tiedeman Island	I/MW	4,750	0	No	No	Yes	No	No
Pleasant Island	I/W	5,256	0	No	No	Yes	No	No
Upper Tenakee Hot Springs	III	15,651	641	No	Yes	No	No	Yes
Swan Cove	I/MW	24,408	0	No	No	Yes	No	No
Tonalite Creek	CLII	9,515	0	No	No	No	No	No
Central Interior Islands								
Bailey Bay Hot Springs	II	2,404	681	No	No	Yes	No	Yes
Falls Creek Windthrow	IV	821	620	No	No	Yes	No	No
Kadin Island	III	1,523	1,042	No	No	Yes	No	No
South Etolin Island	I/W	5,346	0	No	No	No	No	No
Southern Outer Islands								
Mt. Calder-Virginia Mtn.	CLII, IV	5,131	2,866	No	Yes	Yes	No	Yes
Sarkar Lakes	II	8,682	3,912	No	No	Yes	Yes[8]	No
Thunder Mountain	IV	5,189	1,796	No	No	No	No	Yes
Klakas Lake	I/W	7,162	0	No	No	Yes	No	No
Rio Roberts	IV	1,160	440	No	No	No	No	No
El Capitan	IV	2,560	N/A	No	No	No	Yes[9]	Yes

Source: Revision data base, Q1003, April 1991, and information provided by Area and District Staffs.

[1] LUD = existing land use designations as follows: I/W = LUD I Wilderness Area; I/MW = LUD I National Monument Wilderness Area; II = LUD II area; CLII = Congressionally Legislated LUD II; III = LUD III Area; IV = LUD IV Area.

[2] Tent. Suit. Acres = (Tentatively Suitable Acres) forested acres that have the biologic capability of being managed for the production of industrial wood products and are not in LUD's withdrawn from timber harvesting.

[3] Existing cabins and commercial fishing permits.

[4] Sport fishing for northern pike.

[5] Existing cabin and sport fishing.

[6] Potential hydroelectric development site identified by Alaska Power and Telephone.

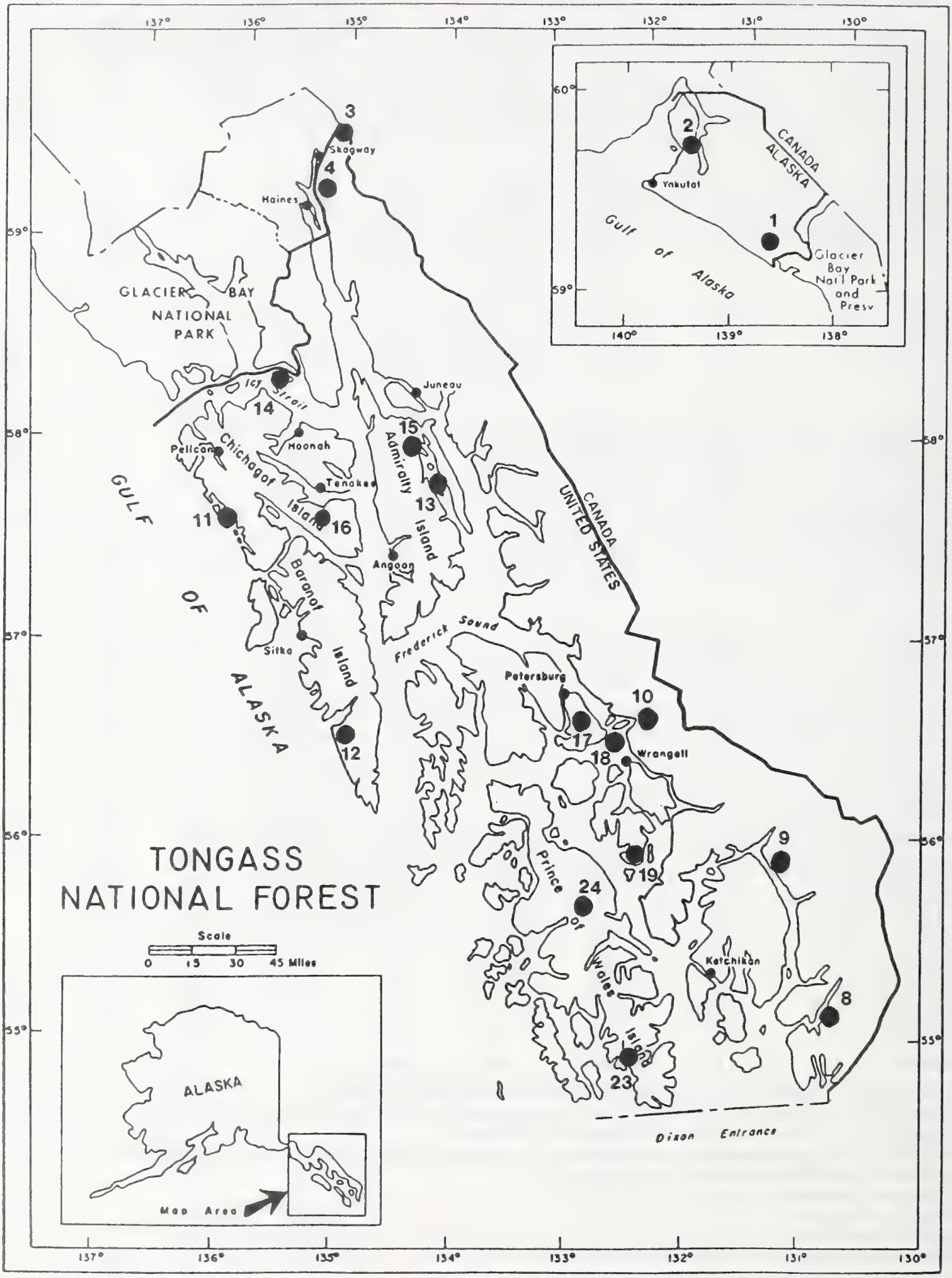
[7] Dispersed recreation use.

[8] Existing cabin, high subsistence use, outfitter & guide use.

[9] Cave resources and dispersed recreation use.

Figure 3-28

Priority Potential Research Natural Area Proposals recommended by the Forest



The Forest Service is recommending that the existing Pack Creek RNA be delisted. Since its establishment in 1951, recreational use to observe brown bears has increased dramatically. Recreational facilities have been constructed to facilitate safe accommodation of the public in viewing bears. Delisting Pack Creek as an RNA is recommended because the high recreation pressure appears to be incompatible with RNA objectives. The Swan Cove RNA proposal which lies to the north of Pack Creek is recommended to replace Pack Creek.

Tables 3-89, 3-90 and 3-91 display how the existing RNA's (except Pack Creek) and the proposed potential RNA's fill the vegetation cell type needs, wildlife cell type needs, and aquatic cell type needs, respectively. Appendix D contains additional information and descriptions for the proposed potential RNA's.

Table 3-89

How existing RNA's and priority potential RNA's fill the vegetation cell types

Existing RNA's and RNA Proposals[1]	**Vegetation Cell Types**[2]												
Yakutat Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*					
1. Akwe-Ustay Lakes	-	-	-	x	-	x	-	x					
2. Mountain Lake	x	x	x	-	-	-	-	-					
Lynn Canal Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*		
3. Warm Pass	-	-	x	-	-	-	x	x	-	x	x		
4. Dayebas Creek	-	x	x	-	-	E	x	x	-	-	x		
Coast Range Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*			
(Limestone Inlet)	-	x	x	x	x	-	-	-	-	-			
(Cape Fanshaw)	-	x	-	E	-	-	-	-	-	-			
(Red River)	-	x	x	x	-	x	-	E	-	-			
8. Martin River	-	-	-	-	-	-	-	-	-	-			
9. Robinson Lake	x	x	x	-	x	x	-	-	-	-			
10. Twin Lakes	-	x	x	-	x	-	-	-	x	E			
N. Outer Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*				
11. Myriad Islands	-	-	-	-	-	E	?	-	-				
12. Plotnikof-Port Banks	x	x	x	x	x	x	?	-	-				
N. Interior Islands Province	*1*	*2*	*3*	*4*	*5*	*6*							
13. Tiedeman Island	x	x	-	-	-	-							
14. Pleasant Island	x	x	-	x	x	-							
15. Swan Cove	x	x	x	x	-	-							
16. Tonalite Creek	E	x	x	x	x	-							
C. Interior Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
17. Falls Creek Windthrow	-	x	-	x	-	-	-	-	-	E	-	-	
18. Kadin Island	-	x	-	-	-	-	-	-	-	-	E	-	
19. South Etolin Island	x	x	x	-	x	E	x	x	-	x	-	-	
S. Outer Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
(Dog Island)	-	x	x	-	x	-	-	-	-		-	E	-
(Old Tom Creek)	x	x	x	x	x	-	-	-	-	-	-	-	-
24. Rio Roberts	E	x	x	-	x	-	-	-	-	-	-	-	-
23. Klakas Lake	x	-	x	x	x	-	-	-	-	-	-	-	-

Source: Juday, et al., 1988 and RNA Steering Committee.

[1] Parentheses ( ) around the RNA name represent existing RNA's.

[2] Definitions of vegetation cell types are in Table 3-85. An "x" indicates that an area has at least a minimal representation of the cell type. An "E" indicates that an area has an exceptional example of the cell type. A "?" indicates possible representation of the cell type. A "-" indicates that the cell type is not represented in that area.

Note: Numbers for each priority potential RNA correspond to the numbers in the preceding map.

Table 3-90

How existing RNA's and the priority potential RNA proposals fill the wildlife cell types

Existing RNA's and RNA Proposals[1]	Wildlife Cell Types[2] 1	2	3	4	5	6	7	8	9
Yakutat Province									
1. Akwe-Ustay Lakes	x	-	-	-	x	-	-	x	-
2. Mountain Lake	-	-	x	x	x	-	-	-	-
Lynn Canal Province									
3. Warm Pass	-	-	x	x	-	-	-	-	-
4. Dayebas Creek	-	-	x	x	-	-	-	x	-
Coast Range Province									
(Limestone Inlet)	-	x	x	x	-	x	x3	-	-
(Cape Fanshaw)	-	-	x	-	-	-	-	-	-
(Red River)	-	x	x	x	-	x	x3	-	-
8. Martin River	x	-	x	x	-	-	-	x	-
9. Robinson Lake	x	-	x	x	x	-	-	-	-
10. Twin Lakes	-	-	x	x	x	-	-	x	-
N. Outer Islands Province									
11. Myriad Islands	-	-	-	-	-	-	x2	-	x
12. Plotnikof-Port Banks	x	-	-	x	x	x	-	-	-
N. Interior Islands Province									
13. Tiedeman Island	-	x	x	-	x	x	-	-	x
14. Pleasant Island	-	-	x	-	x	x	-	-	x
15. Swan Cove	x	x	x	x	-	x	x3	-	-
16. Tonalite Creek	x	x	x	x	x	-	-	-	-
C. Interior Islands Province									
17. Falls Creek Windthrow	-	x	-	-	-	-	-	-	-
18. Kadin Island	-	-	-	-	-	x	-	-	x
19. South Etolin Island	-	x	-	-	-	x	-	-	-
S. Outer Islands Province									
(Dog Island)	-	-	x	-	-	x	-	-	x
(Old Tom Creek)	-	-	x	-	x	x	x	-	-
24. Rio Roberts	x	x	-	-	-	-	-	-	-
23. Klakas Lake	x	-	x	x	x	x	-	-	-

Source: Juday at et al, 1988 and RNA Steering Committee

[1] Parentheses ( ) around the RNA name represent existing RNA's.

[2] Wildlife Cell Types: 1 = Riparian Spruce Habitat; 2 = High to Moderate Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 3 = Low Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 4 = Alpine and Subalpine Habitats; 5 = Wetland Habitats; 6 = Beach Fringe Habitats; 7 = Estuary Habitats (three general types of estuary habitats were recognized: elymus types, sedge types, meadow types; and x1 indicates one type present, x2 indicates two types present, x3 indicates 3 types present; 8 = Deciduous Shrub Habitats; 9 = Small Islands. (For more explanation of wildlife cell types, see Table 3-86)

Note: Numbers for each priority potential RNA correspond to the numbers in the preceding map.

Table 3-91

How the existing RNA's and the priority potential RNA proposals fill the general watershed cell types

Existing RNA's and RNA Proposals[1]	General Watershed Cell Types[2] 1	2	3	4	5	6	7
Yakutat Province							
1. Akwe-Ustay Lakes[3]	-	x	-	-	-	-	-
2. Mountain Lake	-	-	-	x	-	-	-
Lynn Canal Province							
3. Warm Pass	-	-	x	-	-	-	-
4. Dayebas Creek	-	-	-	-	x	-	-
Coast Range Province							
(Limestone Inlet)	-	-	x	-	-	-	-
(Cape Fanshaw)	-	-	-	x	x	-	-
(Red River)	-	-	x	-	-	-	-
8. Martin River	-	-	x	-	-	-	-
9. Robinson Lake	-	-	-	-	-	-	-
10. Twin Lakes	-	x	-	-	-	-	-
N. Outer Islands Province							
11. Myriad Islands	-	-	-	-	-	-	-
12. Plotnikof-Port Banks	-	-	-	x	-	-	-
N. Interior Islands Province							
13. Tiedeman Island	-	-	-	-	x	-	-
14. Pleasant Island	-	-	-	-	x	-	-
15. Swan Cove	-	-	x	-	-	-	-
16. Tonalite Creek	-	-	x	-	-	-	-
C. Interior Islands Province							
17. Falls Creek Windthrow	-	-	x	-	-	-	-
18. Kadin Island	-	-	-	-	x	-	-
19. South Etolin Island	-	-	-	-	-	x	-
S. Outer Islands Province							
(Dog Island)	-	-	-	-	-	-	-
(Old Tom Creek)	-	-	-	-	-	-	x
24. Rio Roberts	-	-	-	-	-	x	-
23. Klakas Lake	-	-	-	x	-	x	-

Source: Juday, et al., 1988 and RNA Steering Committee

[1] Parentheses ( ) around the RNA name represent existing RNA's.

[2] General Watershed Cell Types:
1 = Active Glacial Outwash Plain/Watershed
2 = Active Glacial Mainland Valley
3 = Alluvial "U"-Shaped Valley with Steep Side Slopes
4 = Rock Basin Lake Systems
5 = Steep Streams (Mountain Slope) Terminating in Salt Water
6 = Alluvial, Low Gradient, Rolling Topography (Rolling Ground Moraine)
7 = Raised Marine Terrace with Marine Clays

(For more information on general watershed cell types, see Table 3-87.)

[3] Akway Lake is a clear water, former pro-glacial lake; Ustay Lake is a pro-glacial lake

Note: Numbers for each priority potential RNA correspond to the numbers in the preceding map.

Scientific Accuracy

The natural resource scientists and managers involved with the methodology explained above represent the best knowledge base available for RNA considerations and recommendations at this time. However, it is recognized that they do not have the complete understanding of natural resources in Southeast Alaska. Although recommendations were made for potential areas to fill the "cells," there may be other areas which could also fill the cells which the resource scientists and managers were unaware of at this time.

Most of the knowledge and emphasis is centered around the forested plant communities. There is an acknowledged lack of information for the non-forested plant communities, such as the alpine plant communities, in Southeast Alaska.

Existing natural resource inventories are not perfect and do not answer all of the questions which could be asked about "cell types" in Southeast Alaska. As new natural resource inventories are completed, more knowledge and information will be gained and additional ideas and needs for RNA's will be identified.

Research Natural Areas

Environmental Consequences

Direct and Indirect Effects

This section focuses on the effect that each alternative will have on the present or future establishment of a representative system of Research Natural Areas for the Tongass. The effects of Research Natural Area (RNA) designations on other resources are covered under the sections for those resources. Designation of an area as an RNA will make it unavailable for certain resource uses, in particular those that involve land-altering activities such as timber harvest or road construction. Conversely, an RNA designation will preserve the natural qualities of an area, such as visual quality and existing wildlife habitat. For the purposes of analyzing effects to other resources, the Research Natural Area prescription is a part of the Natural Setting prescription group.

Table 3-92 indicates the priority potential Research Natural Areas recommended for establishment in each alternative, and what management they would receive if they were not established. Alternative A recommends establishment of 18 of the priority potential RNA proposals; Alternative B — 17; Alternative C — 14; Alternative D — 14; and Alternative P — 17.

A total of 69 vegetation cell types were recommended for representation in RNA's within the seven geographic provinces. Table 3-93 illustrates how each of the Alternatives provide for representation of the vegetation cell types in each of the geographic provinces. Alternative A provides representation for 50 vegetation cell types; Alternative B — 48; Alternative C — 46; Alternative D — 46; and Alternative P — 48. Nineteen of the vegetation cell types are not represented by the 18 priority potential RNA proposals and thus are not represented in any of the alternatives.

A total of nine wildlife cell types were recommended for representation in RNA's within each of the seven geographic provinces. Table 3-94 illustrates how each of the alternatives provides for representation of the wildlife cell types in each of the geographic provinces. Although the priority potential RNA proposals do not fill all wildlife cell types in each province, they do provide representation of each wildlife cell type on a Forest-wide basis, with each cell type being represented in at least three provinces.

A total of seven general watershed cell types were recommended for representation in RNA's within each of the seven geographic provinces. Table 3-95 illustrates how each of the alternatives provides for representation of the general watershed cell types in each of the geographic provinces. Although the priority potential RNA proposals do not fill all general watershed cell types in each province, they do provide representation for six of the general watershed cell types on a Forest-wide basis. The "active glacial outwash plain/watershed" cell type is not represented with any of the RNA proposals.

Table 3-92

Summary of how the priority potential RNA proposals are allocated in each alternative

	Alternative [1]				
	A	B	C	D	P
Yakutat Province					
Akwe-Ustay Lakes	R	R	R	R	R
Mountain Lake	R	R	R	R	R
Lynn Canal					
Warm Pass	R	R	R	R	R
Dayebas Creek	R	N	N	N	N
Coast Range Province					
Martin River	R	R	R	R	R
Robinson Lake	R	R	R	R	R
Twin Lakes	R	R	R	R	R
N. Outer Islands Province					
Myriad Islands	R	R	R	R	R
Plotnikof-Pt Banks	R	R	R	R	R
N. Interior Islands Province					
Tiedeman Island	R	R	R	R	R
Pleasant Island	R	R	R	R	R
Swan Cove	R	R	R	R	R
Tonalite Creek	R	R	R	R	R
C. Interior Islands Province					
Falls Creek Windthrow	R	R	I	I	R
Kadin Island	R	R	I/M	I/M	R
South Etolin Island	R	R	R	R	R
S. Outer Islands Province					
Rio Roberts	R	R	I	I	R
Klakas Lake	R	R	R	R	R
Total Recommended	**18**	**17**	**14**	**14**	**17**

[1] Letter symbols represent the following: R= recommended for Research Natural Area designation; N= natural setting prescription group; M= moderate development presciption group; I= intensive development presciption group.

Table 3-93

Comparison of how each alternative provides for representation of the Vegetation Cell Types in each Geographic Province[1]

	Vegetation Cell Type[2]												
Yakutat Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*					
Alternative A	x	x	x	x	-	x	-	x					
Alternative B	x	x	x	x	-	x	-	x					
Alternative C	x	x	x	x	-	x	-	x					
Alternative D	x	x	x	x	-	x	-	x					
Alternative P	x	x	x	x	-	x	-	x					
Lynn Canal Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*		
Alternative A	-	x	x	-	-	x	x	x	-	x	x		
Alternative B	-	-	x	-	-	-	x	x	-	x	x		
Alternative C	-	-	x	-	-	-	x	x	-	x	x		
Alternative D	-	-	x	-	-	-	x	x	-	x	x		
Alternative P	-	-	x	-	-	-	x	x	-	x	x		
Coast Range Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*			
Alternative A	x	x	x	x	x	x	-	x	x	x			
Alternative B	x	x	x	x	x	x	-	x	x	x			
Alternative C	x	x	x	x	x	x	-	x	x	x			
Alternative D	x	x	x	x	x	x	-	x	x	x			
Alternative P	x	x	x	x	x	x	-	x	x	x			
N. Outer Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*				
Alternative A	x	x	x	x	x	x	?	-	-				
Alternative B	x	x	x	x	x	x	?	-	-				
Alternative C	x	x	x	x	x	x	?	-	-				
Alternative D	x	x	x	x	x	x	?	-	-				
Alternative P	x	x	x	x	x	x	?	-	-				
N. Interior Islands Province	*1*	*2*	*3*	*4*	*5*	*6*							
Alternative A	x	x	x	x	x	-							
Alternative B	x	x	x	x	x	-							
Alternative C	x	x	x	x	x	-							
Alternative D	x	x	x	x	x	-							
Alternative P	x	x	x	x	x	-							
C. Interior Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
Alternative A	x	x	x	x	x	x	x	x	-	x	x	-	
Alternative B	x	x	x	x	x	x	x	x	-	x	x	-	
Alternative C	x	x	x	-	x	x	x	x	-	x	-	-	
Alternative D	x	x	x	-	x	x	x	x	-	x	-	-	
Alternative P	x	x	x	x	x	x	x	x	-	x	x	-	
S. Outer Islands Pr.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Alternative A	x	x	x	x	x	-	-	-	-	-	-	x	-
Alternative B	x	x	x	x	x	-	-	-	-	-	-	x	-
Alternative C	x	x	x	x	x	-	-	-	-	-	-	x	-
Alternative D	x	x	x	x	x	-	-	-	-	-	-	x	-
Alternative P	x	x	x	x	x	-	-	-	-	-	-	x	-

[1] An "x" indicates representation of the cell type. An "?" indicates possible representation of the cell type, but additional field work is needed for verification.

[2] Vegetation cell type numbers refer to the numbers for each cell type presented in Table 3-85.

Table 3-94

Comparison of how each alternative provides for representation of the Wildlife Cell Types in each geographic province

	Wildlife Cell Types[1]								
Yakutat Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Alternative A	x	-	x	x	x	-	-	x	-
Alternative B	x	-	x	x	x	-	-	x	-
Alternative C	x	-	x	x	x	-	-	x	-
Alternative D	x	-	x	x	x	-	-	x	-
Alternative P	x	-	x	x	x	-	-	x	-
Lynn Canal Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Alternative A	-	-	x	x	-	-	-	x	-
Alternative B	-	-	x	x	-	-	-	-	-
Alternative C	-	-	x	x	-	-	-	-	-
Alternative D	-	-	x	x	-	-	-	-	-
Alternative P	-	-	x	x	-	-		-	-
Coast Range Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Alternative A	x	x	x	x	x	x	x	x	-
Alternative B	x	x	x	x	x	x	x	x	-
Alternative C	x	x	x	x	x	x	x	x	-
Alternative D	x	x	x	x	x	x	x	x	-
Alternative P	x	x	x	x	x	x	x	x	-
N. Outer Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Alternative A	x	-	-	x	x	x	x	-	x
Alternative B	x	-	-	x	x	x	x	-	x
Alternative C	x	-	-	x	x	x	x	-	x
Alternative D	x	-	-	x	x	x	x	-	x
Alternative P	x	-	-	x	x	x	x	-	x
N. Interior Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Alternative A	x	x	x	x	x	x	x	-	x
Alternative B	x	x	x	x	x	x	x	-	x
Alternative C	x	x	x	x	x	x	x	-	x
Alternative D	x	x	x	x	x	x	x	-	x
Alternative P	x	x	x	x	x	x	x	-	x
C. Interior Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Alternative A	-	x	-	-	-	x	-	-	x
Alternative B	-	x	-	-	-	x	-	-	x
Alternative C	-	x	-	-	-	x	-	-	-
Alternative D	-	x	-	-	-	x	-	-	-
Alternative P	-	x	-	-	-	x	-	-	x
S. Outer Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Alternative A	x	x	x	x	x	x	x	-	x
Alternative B	x	x	x	x	x	x	x	-	x
Alternative C	x	-	x	x	x	x	x	-	x
Alternative D	x	-	x	x	x	x	x	-	x
Alternative P	x	x	x	x	x	x	x	-	x

[1] Wildlife Cell Types: 1 = Riparian Spruce Habitat; 2 = High to Moderate Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 3 = Low Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 4 = Alpine and Subalpine Habitats; 5 = Wetland Habitats; 6 = Beach Fringe Habitats; 7 = Estuary Habitats; 8 = Deciduous Shrub Habitats; 9 = Small Islands. An "x" indicates representation of the cell type.

Table 3-95

Comparison of how each alternative provides for representation of the General Watershed Cell Types in each geographic province

	General Watershed Cell Types[1]						
Yakutat Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Alternative A	-	x	-	x	-	-	-
Alternative B	-	x	-	x	-	-	-
Alternative C	-	x	-	x	-	-	-
Alternative D	-	x	-	x	-	-	-
Alternative P	-	x	-	x	-	-	-
Lynn Canal Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Alternative A	-	-	x	-	x	-	-
Alternative B	-	-	x	-	-	-	-
Alternative C	-	-	x	-	-	-	-
Alternative D	-	-	x	-	-	-	-
Alternative P	-	-	x	-	-	-	-
Coast Range Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Alternative A	-	x	x	x	x	-	-
Alternative B	-	x	x	x	x	-	-
Alternative C	-	x	x	x	x	-	-
Alternative D	-	x	x	x	x	-	-
Alternative P	-	x	x	x	x	-	-
N. Outer Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Alternative A	-	-	-	x	-	-	-
Alternative B	-	-	-	x	-	-	-
Alternative C	-	-	-	x	-	-	-
Alternative D	-	-	-	x	-	-	-
Alternative P	-	-	-	x	-	-	-
N. Interior Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Alternative A	-	-	x	-	x	-	-
Alternative B	-	-	x	-	x	-	-
Alternative C	-	-	x	-	x	-	-
Alternative D	-	-	x	-	x	-	-
Alternative P	-	-	x	-	x	-	-
C. Interior Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Alternative A	-	-	x	-	x	x	-
Alternative B	-	-	x	-	x	x	-
Alternative C	-	-	-	-	-	x	-
Alternative D	-	-	-	-	-	x	-
Alternative P	-	-	x	-	x	x	-
S. Outer Islands Province	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Alternative A	-	-	x	-	-	x	x
Alternative B	-	-	x	-	-	x	x
Alternative C	-	-	x	-	-	x	x
Alternative D	-	-	x	-	-	x	x
Alternative P	-	-	x	-	-	x	x

[1] General Aquatic Cell Types: 1 = Active Glacial Outwash Plain/Watershed; 2 = Active Glacial Mainland Valley; 3 = Alluvial "U"-Shaped Valley with Steep Side Slopes; 4 = Rock Basin Lake Systems; 5 = Steep Streams (Mountain Slope) Terminating in Salt Water; 6 = Alluvial, Low Gradient, Rolling Topography (Rolling Ground Moraine); 7 = Raised Marine Terrace with Marine Clays. An "x" indicates at least a minimal representation of the cell type.

Proposing areas as RNA's will have effects on other natural resource uses which occur in these specific areas. Table 3-96 displays information on other natural resources and uses associated with the RNA proposals.

A total of 3,306 acres of tentatively suitable forested land is located within the RNA proposals. Timber harvesting is not compatible with RNA's, therefore each alternative would result in the following acres being removed from timber management opportunities: Alternative A - 3,306 acres; Alternative B - 2,666 acres; Alternative C - 564 acres; Alternative D - 564 acres; Alternative P - 2,666 acres.

Generally, RNA's are withdrawn from mineral entry, subject to valid existing rights at the time of RNA designation. None of the RNA proposals are within areas of known high mineral potential.

Two of the RNA proposals (Dayebas Creek and Twin Lakes) are within identified future potential transportation corridors. Alternative A contains both of these RNA proposals, while the other alternatives contain one (Twin Lakes).

Nine of the RNA proposals are within identified recreation places (as defined by the recreation inventory). Alternatives A, B, and P each contain all nine of these RNA's, while Alternative C and D contain seven of these RNA's. At the present time, the amount of dispersed recreation use occurring at these sites is not adversely affecting the natural resources in a way to conflict with RNA designation. However, if these sites are designated as RNA's, the amount and type of recreation use may need to be managed and possibly restricted if the recreation use becomes incompatible with RNA objectives.

One site, Dayebas Creek, has been identified as a potential hydroelectric development site by Alaska Power and Telephone. Dayebas Creek is recommended as an RNA in Alternative A but not in the other alternatives.

Over time, potential Research Natural Areas that are not designated may lose the natural qualities which qualified them for Research Natural Area consideration. This will occur primarily where land-altering activities take place. As potential but undesignated areas are changed in this way, the opportunities for research on the various ecological systems and their cell types will diminish. Alternatives C and D, with the fewest number of RNA proposals, have the greatest potential for the cumulative loss of research opportunities.

Seven areas proposed by the RNA Steering Committee as priority potential RNA's have been recommended by the Forest Service as better suited to the Special Interest Areas LUD. These seven areas are: Pike Lakes, Blue Lake Lava (also called Blue River), Crater-Ridge Fred's Creek (also referred to as Mt. Edgecumbe), Bailey Bay Hot Springs, Mount Calder/Virginia Mountain (referred to as Karst Areas), Thunder Mountain (referred to as Karst Areas), and El Capitan (referred to as Karst Areas). The section on Special Interest Areas discusses these seven sites.

Table 3-96

Existing LUD Allocations and other natural resources and uses associated with the priority potential RNA proposals considered in the alternatives

Geographic Province & RNA Proposal (Total Acres)	LUD[1]	Total Acres	Tent. Suit. Acres[2]	High Minerals Potential	Potential Transportation Conflicts	Identified Recreation Place	Other Uses & Other Recreation
Yakutat Forelands							
Akwe-Ustay Lakes	II	9,786	504	No	No	No	No
Mountain Lake	I/W	5,425	0	No	No	No	No
Lynn Canal							
Warm Pass	II	10,560	60	No	No	Yes	No
Dayebas Creek	II	8,724	640	No	Yes	No	Yes[3]
Coast Range							
Martin River	I/MW	6,213	0	No	No	No	No
Robinson Lake	I/MW	4,297	0	No	No	No	No
Twin Lakes	I/W	7,202	0	No	Yes	Yes	No
Northern Outer Islands							
Myriad Islands	I/W	302	0	No	No	No	No
Plotnikof-Port Banks	I/W	16,723	0	No	No	Yes	No
Northern Interior Islands							
Tiedeman Island	I/MW	4,750	0	No	No	Yes	No
Pleasant Island	I/W	5,256	0	No	No	Yes	No
Swan Cove	I/MW	24,408	0	No	No	Yes	No
Tonalite Creek	CLII	9,515	0	No	No	No	No
Central Interior Islands							
Falls Creek Windthrow	IV	821	620	No	No	Yes	No
Kadin Island	III	1,523	1,042	No	No	Yes	No
South Etolin Island	I/W	5,346	0	No	No	No	No
Southern Outer Islands							
Klakas Lake	I/W	7,162	0	No	No	Yes	No
Rio Roberts	IV	1,160	440	No	No	No	No

Source: Revision data base, Q1003, April 1991, and information provided by Area and District Staffs.

[1] LUD = existing land use designations as follows: I/W = LUD I Wilderness Area; I/MW = LUD I National Monument Wilderness Area; II = LUD II area; CLII = Congressionally Legislated LUD II; III = LUD III Area; IV = LUD IV Area.

[2] Tent. Suit. Acres = forested acres that have the biologic capability of being managed for the production of industrial wood products and are not in LUD's withdrawn from timber harvesting.

[3] Potential hydroelectric development site identified by Alaska Power and Telephone.

Roadless Areas

Affected Environment

Changes Since the DEIS

In November 1990, five new Wilderness areas and one addition, to an existing Wilderness area, totaling 300,473 acres (including non-National Forest lands totaling 776 acres) were designated on the Tongass as a result of the Tongass Timber Reform Act. They are described in the Wilderness section of Chapter 3. The Act also established 12 permanent "LUD II" areas totaling 727,765 acres (includes 3,477 acres of non-National Forest lands), a designation that will maintain their roadless and natural characteristics. Because these areas are still available for future consideration as Wilderness and meet the minimum criteria for consideration, they are included within the roadless areas described in Appendix C and in the tables of this section.

The various legislative proposals for Wilderness displayed in the DEIS are no longer applicable as a result of the Tongass Timber Reform Act. The Roadless Area environmental consequences section describes in tables and narrative format how specific roadless areas are affected by their designation as either Wilderness or legislated LUD II as a result of the Tongass Timber Reform Act.

Roadless Areas and their acres have changed since the DEIS, primarily due to three factors. First, the creation of the new Wilderness areas, as described above, has removed those acres from the roadless category. Second, portions of some previously unroaded areas have been roaded and harvested during the past two years. Third, better inventory information has resulted in more accurate mapping of road and harvest area locations along the boundaries of some roadless areas.

Introduction

This section identifies the roadless areas which meet the minimum criteria for potential inclusion in the National Wilderness System. Identifying this potential does not imply that areas should or should not be recommended for designation as Wilderness, but is intended to portray the remaining undeveloped portions of the National Forest for which Wilderness is a future option.

Once an area is roaded it is generally no longer available for Wilderness consideration. Depending on when and how the activity was conducted, evidence of previous timber harvest, abandoned habitations, and historic mining may not necessarily result in an irreversible removal of land from future Wilderness consideration.

The minimum criteria for considering a roadless area in the evaluation of Wilderness potential was established by the Wilderness Act of 1964 and in subsequent regulation and policies. To qualify, an area must contain at least 5,000 acres of undeveloped land which does not contain improved roads maintained for travel by passenger-type vehicles. However, areas less than 5,000 acres may qualify if they are a self-contained ecosystem such as an island, are contiguous to existing Wilderness, or are ecologically isolated by topography and manageable in a natural condition.

The roadless inventory makes known the extent of the roadless resource, and provides data for use by managers, legislators and others to formulate land management proposals. Roadless areas may retain their roadless character by being managed for emphases which require relatively large, undeveloped or natural areas, such as usually required for old-growth habitat, scenic backdrops or for primitive recreation. Roadless areas identified in the inventory which are outside of existing designated Wilderness may be considered for Wilderness recommendation or may be managed for a wide range of other resource management activities.

Effects of Tongass Timber Reform Act

The Tongass Timber Reform Act passed in November 1990 created five new Wilderness areas, one Wilderness addition, and 12 legislated LUD II areas totaling 1,027,461 acres. These 18 areas are all or part of most of the areas proposed as Wilderness in House of Representatives Bill H.R. 987. Because these designations are directed by law, they are common to all alternatives. Table 3-97 and the following descriptions display and describe the new Wilderness and legislated LUD II areas, their acreages, and the roadless areas they are a part of. The five new Wilderness areas and one Wilderness addition are described in detail in the Wilderness section of this chapter.

Table 3-97

National Forest, non-National Forest, productive old growth, tentatively suitable forest lands within each of the legislated Tongass Timber Reform Act areas and the acreage of the corresponding roadless area

Name	Total Acres	National Forest Acres	Non-National Forest Acres	Productive Old Growth Acres	Tentatively Suitable Forest Lands Withdrawn (Acres)	Corresponding Roadless Area	Total Acres
New Legislated Wilderness Areas							
Pleasant/Lemesurier/Inian Islands	23,151	23,096	55	11,717	9,318	Chichagof	561,042
						Pleasant	12,239
Kuiu	60,581	60,581	0	39,057	27,447	South Kuiu	62,983
Young Lake Addition	18,486	18,462	24	9,151	7,849	Greens Creek	27,736
Chuck River	74,990	74,298	692	43,371	32,618	Windham-Pt. Houghton	165,896
Karta	39,894	39,889	5	22,594	21,634	Karta	59,489
South Etolin	83,371	83,371	0	37,509	27,576	South Etolin Island	29,240
Total	**300,473**	**299,697**	**776**	**163,399**	**126,442**		
New Legislated LUD II Areas							
Yakutat	139,045	139,035	10	72,312	45,948	Yakutat Forelands	319,107
Berners Bay	45,223	45,233	0	15,450	8,944	Juneau-Skagway Ice	1,196,837
						Juneau-Urban	102,410
Anan	38,313	38,313	0	16,426	8,363	Anan	37,953
						Harding	177,559
Kadashan	34,441	34,281	160	20,609	13,493	Chichagof	561,042
Lisianski/Upper Hoonah	149,088	147,132	1,956	44,398	29,312	Hoonah Sound	93,880
						Chichagof	561,042
Mt. Calder-Holbrook	60,863	60,863	0	38,682	36,420	Calder	11,041
						Kosciusko	65,598
Nutkwa	21,723	21,723	0	13,222	11,102	Nutkwa	62,158
Outside Islands	75,720	75,342	378	46,200	38,890	Outer Islands	100,037
Trap Bay	6,595	6,595	0	4,297	3,178	Trap Bay	14,178
Pt. Adolphus/Mud Bay	117,877	116,695	182	38,249	25,178	Chichagof	561,042
Naha	31,365	31,350	15	17,875	15,955	North Revilla	158,931
Salmon Bay	11,200	11,200	0	4,791	4,471	Salmon Bay	25,229
Total	**730,463**	**727,762**	**2,701**	**332,511**	**241,254**		
Grand Total	**1,030,936**	**1,027,459**	**3,477**	**495,900**	**367,696**		

Source: Revision data base, Oracle Queries Q1006B and QTent, 6/91, and RO-Geometronics, 6/91.

Yakutat

Of the Yakutat Forelands Roadless Area (No. 339), 139,035 acres (44 percent) are designated as the Yakutat legislated LUD II area. It includes all the VCU's in this area (379C, 382C, 386C, 387C, 388C, and 389C) that are surrounded for the most part by LUD II areas in the 1979 Tongass Land Management Plan. It is also bordered on the northwest corner by the Russell Fiord Wilderness and on the southeast by Glacier Bay National Park, and is roughly 20 miles east of the village of Yakutat.

Berners Bay

Of both the Juneau-Skagway Icefield Roadless Area (No. 301) and the Juneau-Urban Roadless Area (No. 305), 45,233 acres (3 percent) are designated as the Berners Bay legislated LUD II area.

This legislated LUD II on the east side of Lynn Canal, includes the lower valleys of the Berners, Lace and Gilkey Rivers, and the east side of Berners Bay. The area encompasses the southern ends of VCU's 12C and 13C, and the east side of 16C (Berners Bay). This LUD II is about 40 miles north of Juneau and is about five miles north of the terminus of the existing Juneau road system.

Anan

This 38,313-acres LUD II has common boundaries with the Anan Roadless Area (No. 209). This area includes all of VCU 522S and is located on Cleveland Peninsula adjacent to Bradfield Canal and Ernest Sound about 30 miles southeast of Wrangell. It includes the Anan Creek drainage which contains Anan Lake, Boulder Lake and numerous other small lakes.

Kadashan

Of the Chichagof Roadless Area (No. 311), 34,441 acres (6 percent) are designated as the Kadashan legislated LUD II area. It occupies the entire Kadashan River drainage (VCU 235C) on Chichagof Island. The area is approximately five miles south of the community of Tenakee Springs.

Lisianski River/Upper Hoonah Sound

Of the Chichagof Roadless Area (No. 311), 149,088 acres (26 percent) are designated as the Lisianski River/Upper Hoonah Sound legislated LUD II area. It includes all of the 1979 TLMP management area C35 encompassing the upper part of Hoonah Sound and the upper reaches of the Lisianski River, VCU's 250C, 251C, and 252C around the village of Pelican, VCU's 282C and 283C on the west side of Upper Hoonah Sound, and VCU 247C on the east side of Upper Hoonah Sound. Much of the west side of this LUD II borders on the West Chichagof-Yakobi Wilderness.

Mt. Calder/Holbrook

Of the Kosciusko Roadless Area (No. 515) and the Calder Roadless Area (No. 516), 60,863 acres (79 percent) are designated as the Mt. Calder/Holbrook legislated LUD II area. It encompasses much of the roadless portion of Kosciusko Island except those portions of VCU's 537K and 542K along the west side of El Capitan Pass. It also includes the islands within Shakan Bay (part of VCU 531K), roughly the west face of Calder Mountain from Calder Bay to just north of Hole-in-the-Wall on Prince of Wales Island (western portion of VCU 528), and the group of islands that lie primarily in Sumner Strait between Port Protection and the east side of Kuiu Island (portions of VCU's 416S and 417S).

Nutkwa

Of the Nutkwa Roadless Area (No. 531), 21,723 acres (35 percent) are designated as the Nutkwa legislated LUD II area. It is approximately 16 miles east of the village of Hydaburg and borders the northwestern corner of the South Prince of Wales Wilderness. It includes all of VCU 686K which takes in all the Nutkwa drainage system, and all of Nutkwa Lagoon except the area near the outlet of the Lagoon which is part of Native lands. This latter portion represents the northern part of VCU 685K.

Outside Islands

This LUD II includes 75 percent of the Outer Islands Roadless Area (No. 503) except San Fernando Island. This 75,720 acre area consists of Noyes, Baker, Lulu Islands and several smaller islands off the west coast of Prince of Wales Island. It includes all of VCU's 567K, 568K and 569K. Noyes and Baker Islands face the Pacific Ocean, and the area is approximately 16 miles west of the villages of Craig and Klawock.

Trap Bay

This LUD II is a 6,595 acre (47 percent) portion of the Trap Bay Roadless Area (No. 312). It comprises all of VCU 237C, and is located on Chichagof Island on the south side of the entrance to Tenakee Inlet, about 10 miles from the community of Tenakee Springs.

Point Adolphus/Mud Bay

Of the Mud Bay-Chichagof Roadless Areas (No 311), 117,877 acres (21 percent) are designated as the Point Adolphus/Mud Bay legislated LUD II area. It encompasses much of the northern end of Chichagof Island along Icy Strait across from the entrance to Glacier Bay. The area includes all or portions of the VCU's surrounding Mud Bay (all of VCU's 191C and 192C and parts of VCU's 193C, 194C and 195C), and all of VCU 189C around the head of Elfin Cove. This newly legislated LUD II area expands the existing LUD II area around Idaho Inlet on the west and east side.

Naha

This LUD II includes a 31,365 acre (20 percent) portion of the North Revilla Roadless Area (No. 526). It takes in all of the Naha River drainage (VCU 742K) on the west side of Revillagigedo Island. The area is about 20 miles north of Ketchikan and directly adjacent to the small community of Loring. This area includes a saltwater lagoon, river and several lakes.

Salmon Bay

This LUD II area includes a 11,200 acre (44 percent) portion of the Salmon Bay Roadless Area (No. 518). It encompasses the west side of VCU 534.1K at the extreme northeastern tip of Prince of Wales Island. It also incorporates the portion of VCU 534K that includes most of the islands, estuarine area and channels around the mouth of this drainage, and the land area that is part of the lower watershed around Salmon Bay Lake. The area is about 16 miles north of the community of Whale Pass on Prince of Wales Island, and 30 miles west of Wrangell.

Current Situation

The Tongass National Forest, the largest in the National Forest System, is 91 percent roadless. Only small areas where communities are developing, or where road construction and timber harvest have occurred, are "developed" to any noticeable degree. At various times in the past, "boom and bust" development (associated with fox farming, salmon canneries, mining, and military activity) resulted in the temporary development and occupation of many small areas that have since been largely reclaimed by nature. Developed areas total 1.6 million acres, or

nine percent of the Tongass. Southeast Alaska residents, who number only 60,000, are virtually surrounded by land they consider "wilderness." Routine travel and ordinary outdoor recreation activities may require a higher degree of skill, risk-taking and self-reliance than are typically required of adventurous backcountry visitors on other National Forests. This wildness and the lifestyles associated with it are highly prized by residents and visitors alike.

The second Roadless Area Review and Evaluation (RARE II), completed in 1979 concurrent with the 1979 Tongass Land Management Plan, identified over 700 individual watersheds as completely roadless, totaling some 13 million acres. In December 1980, the Alaska National Interest Lands Conservation Act (ANILCA) designated 5.45 million acres as Wilderness. Three small areas adjacent to the South Prince of Wales Wilderness, Stikine-LeConte Wilderness, and Tebenkof Bay Wilderness, were proposed as Wilderness in the ANILCA debate, but were not designated as Wilderness. Current direction for these areas is to maintain their present condition until completion of the Forest Plan Revision.

The 105 roadless areas identified in the Forest Plan Revision total about 9.6 million acres of National Forest lands. Their size, and the amount of each area that is tentatively suitable timber land, is shown in Table 3-98. Their location and relative size is depicted in the "Roadless Areas" map in the map packet. Details regarding each roadless area are displayed in Appendix C.

Several characteristics of roadless areas on the Tongass represent potentials unavailable elsewhere in the National Forest System. The Tongass has very large undeveloped land areas that could potentially be managed as Wilderness or in an unroaded condition. Several portions of the Forest constitute contiguous roadless areas exceeding one million acres, and thus represent large, unfragmented wildlife habitats and outstanding opportunities for solitude.

Many of the Tongass roadless areas represent wildlife habitats, ecosystems, and visual character that exist nowhere else in the National Forest System, such as coastal islands facing the open Pacific, extensive beaches on inland saltwater, old-growth temperate rain forests, ice fields, and glaciers. All of these features are represented in the existing 5.75 million acres designated as Wilderness. Many of these areas are remote, difficult to access for primitive recreation, and many contain other important resources such as timber, minerals, and salmon-producing streams. Of the 2.56 million acres of tentatively suitable forest land on the Tongass outside Wilderness and legislated LUD II areas, 1.66 million acres, or 65 percent, is within roadless areas (see Table 3-98). For comparison, existing Wilderness on the Tongass contains approximately 1.33 million acres of forest land that would be considered tentatively suitable for timber harvest if they were not located within Wilderness.

Table 3-98

Tongass National Forest Roadless Areas

Roadless Area Number	Gross Acres	National Forest Acres	Non-NF Acres	Tentatively Suitable Acres	Tentatively Suitable %
Chatham Area					
301	1,196,837	1,196,777	60	22,865	1.9
302	722,134	722,015	120	66,004	9.1
303	66,217	66,217	0	8,285	12.5
304	205,682	205,501	180	38,347	18.6
305	102,410	102,410	0	27,815	27.2
306	54,853	54,773	80	23,082	42.1
307	27,736	27,716	20	3,960	14.3
308	165,896	165,876	20	77,307	46.6
309	6,290	6,290	0	3,547	56.4
310	28,609	28,549	60	10,355	36.2
311	561,042	558,380	2,662	66,195	11.8
312	14,178	14,178	0	1,875	13.2
314	10,698	10,698	0	3,216	30.1
317	15,319	15,319	0	7,859	51.3
318	5,800	5,780	20	2,260	39.0
319	5,800	5,800	0	4,380	75.5
321	21,722	21,722	0	4,420	20.3
323	35,900	35,740	160	7,177	20.0
325	51,069	45,266	5,803	11,681	22.9
326	27,987	27,987	0	7,452	26.6
327	14,361	14,361	0	5,287	36.8
328	93,880	93,880	0	10,545	11.2
329	55,699	55,699	0	6,126	11.0
330	337,976	335,975	2,000	57,371	17.0
331	118,595	117,495	1,100	7,262	6.1
332	17,456	17,456	0	6,059	34.7
333	77,181	73,360	3,821	19,945	25.8
334	122,545	122,165	380	11,376	9.3
338	500,153	500,153	0	0	0.0
339	319,107	316,950	2,157	15,949	5.0
341	31,334	31,035	299	13,910	44.4
342	6,366	6,306	60	1,281	20.1
343	6,487	6,487	0	2,222	34.3
344	13,480	12,720	760	6,721	49.9
Area Total	**5,040,799**	**5,021,036**	**19,762**	**562,136**	**11.2**
Stikine Area					
201	48,751	48,751	0	19,459	39.9
202	539,034	538,391	643	31,828	5.9
204	72,739	68,938	3,801	21,526	29.6
205	78,924	78,924	0	6,679	8.5
206	128,574	128,574	0	3,990	3.1
207	180,461	179,680	781	21,107	11.7
208	202,264	201,944	320	6,656	3.3
209	37,953	37,953	0	80	0.2
210	40,515	40,515	0	9,990	24.7
211	136,649	114,106	2,542	17,757	13.0
212	13,524	13,524	0	3,422	25.3
213	20,037	19,358	679	5,139	25.6
214	209,517	209,517	0	41,998	20.0
215	49,280	49,280	0	10,173	20.6
216	26,977	22,437	4,540	7,400	27.4
217	12,219	10,360	1,859	3,220	26.4
218	10,176	10,156	20	4,938	48.5
219	9,394	5,836	3,558	1,239	13.2
220	9,849	9,769	80	2,763	28.1
223	7,990	7,790	200	2,624	32.8

Table 3-98 (continued)

Tongass National Forest Roadless Areas

Roadless Area Number	Gross Acres	National Forest Acres	Non-NF Acres	Tentatively Suitable Acres	Tentatively Suitable %
224	20,955	18,533	2,422	5,184	24.7
225	1,623	1,623	0	1,122	69.1
227	10,324	8,043	2,280	2,922	28.3
229	66,411	62,073	4,338	17,957	27.0
231	9,713	9,713	0	3,425	35.3
232	45,115	45,115	0	15,900	35.2
233	57,154	57,154	0	20,523	35.9
234	29,240	29,240	0	8,419	28.8
235	6,466	6,466	0	1,656	25.6
237	31,948	31,948	0	9,534	29.8
238	5,746	5,746	0	4,052	70.5
239	11,425	9,981	1,443	3,768	33.0
240	36,564	36,564	0	12,190	33.3
241	7,296	7,296	0	4,550	62.4
242	37,130	37,130	0	14,215	38.3
243	78,155	78,135	20	26,858	34.4
244	28,869	28,849	20	16,266	56.3
245	43,995	43,995	0	19,190	43.6
246	62,983	62,983	0	25,959	41.2
247	6,881	6,881	0	2,820	41.0
Area Total	**2,432,820**	**2,383,271**	**49,546**	**438,498**	**18.4**
Ketchikan Area					
501	133,578	105,707	27,871	48,882	36.6
502	33,883	33,524	359	17,585	51.9
503	100,037	99,876	161	6,001	6.0
504	49,621	46,105	3,516	13,044	26.3
505	100,778	83,629	17,149	29,041	28.8
507	241,552	222,837	18,715	83,025	34.4
508	7,268	7,268	0	4,939	68.0
509	72,281	72,261	20	22,642	31.3
510	59,489	56,320	3,168	14,894	25.0
511	91,530	91,530	0	40,183	43.9
512	6,586	6,586	0	2,884	43.8
514	65,076	64,956	120	26,943	41.4
515	65,598	65,277	321	12,964	19.8
516	11,041	11,041	0	1,285	11.6
517	29,545	29,525	20	12,482	42.2
518	25,229	25,169	59	5,174	20.5
519	138,552	119,836	18,716	3,612	24.3
520	8,255	8,114	140	2,666	32.3
521	43,969	43,908	60	5,809	13.2
522	58,816	37,506	21,310	14,931	25.4
523	68,979	68,559	420	20,589	29.8
524	150,769	131,856	18,913	42,763	28.4
525	5,526	5,524	2	1,161	74.3
526	158,931	158,831	100	40,546	25.5
527	6,315	6,315	0	2,626	41.6
528	199,883	191,430	8,453	76,837	38.4
529	112,795	112,775	20	41,266	36.6
530	124,304	123,644	660	10,242	8.2
531	62,158	57,599	4,559	17,090	27.5
532	179	179	0	139	77.7
577	139,159	139,059	100	0	0.0
Area Total	**2,371,682**	**2,226,746**	**144,932**	**652,245**	**29.3**
Forest Total	**9,845,321**	**9,631,053**	**214,240**	**1,652,879**	**17.2**

Source: Revision Database, Query #QRDLS1UP and #RDLS1

Historic Trends

Until the Second World War, the entire Tongass National Forest was virtually unroaded and undeveloped with the exception of a few small communities and isolated fox farms and canneries. Small scale "hand logging" along shorelines had occurred in many areas, but was not accompanied by roads and other development. Significant industrial timber harvest did not begin until the early 1950's with the opening of pulp mills and the negotiation of the long-term timber sale contracts. Since 1900 about 415,000 acres have had timber harvest activities, with 88 percent of the harvest occurring since 1952. Since the approval of the Tongass Land Management Plan in 1979, about 106,000 acres of National Forest land has been altered by timber harvest. Currently, 83 percent of nonwilderness National Forest lands are roadless.

Appendix C describes the attributes and resource potentials of each roadless area, evaluates the area's capability and availability for management as Wilderness or allocation to other roadless management prescriptions, and displays the effects of the alternatives on each.

Future Trends

Public recreation use of Southeast Alaska's roadless undeveloped lands is light but increasing. Modern technology has made available improved rainwear, camping equipment, high quality ocean kayaks, portable marine radios, and other gear which respond to new trends, or lead to increased use. Continued tourism marketing may also lead to increased public use of wilderness and roadless area recreation opportunities. Demand for natural areas to provide clean water and air, reduce effects of global warming, and to counter deforestation in other countries is also increasing as these global issues increase in importance.

Roadless Areas

Environmental Consequences

Direct, Indirect, and Cumulative Effects

No additional Wilderness is proposed in any alternative. Congress recently considered the Wilderness issue for the Tongass, and designated 300,473 acres (299,697 National Forest acres) as Wilderness through the Tongass Timber Reform Act.

Table 3-99 displays how the roadless lands were allocated to individual land use designations in each alternative. Subtitles indicate groupings into categories of natural setting, moderate development and intensive development. The groupings indicate the potential for development or for maintaining the natural setting and, therefore, a future Wilderness option. Implementation will determine the location, timing or intensity of actual project activities within any particular area. In Appendix C, activities associated with decisions based on the Supplemental Environmental Impact Statement for the 1986-90 Operating Period of the Alaska Pulp Company and the Environmental Impact Statement for the 1989-1994 Ketchikan Pulp Corporation Long-term sale are identified more specifically in descriptions and environmental consequences for individual roadless areas.

In general, management prescriptions for land use designations which allow intensive development include timber production with associated road and log transfer facility construction in areas where suitable forest lands occur. Management prescriptions which allow moderate development also allow the construction of roads, harvesting of timber and construction of recreation facilities, but place more constraints on the extent and visual impact of such activities. The management prescriptions which emphasize maintaining the natural setting and undeveloped character of the area generally do not allow timber harvesting or the development of major recreation facilities, although roads linking transportation systems, particularly major State corridors, may occur.

Not all areas subject to development allowed by the land use designation would actually be developed. The analysis at the Forest-wide level serves primarily as a general indication of the effects of the alternatives on the future potential to recommend roadless areas for designation as Wilderness. In addition, not all of the effects of the alternatives occur at once. The maximum amount of road construction and timber harvest that occurs in the first decade in any alternative is estimated to be a maximum amount of 2,280 miles of road and 169,000 acres of harvest (Alternative D). Using a quarter mile affected zone around any new road construction and considering that then as a "roaded" area, this means that about 729,600 acres of current roadless area would become roaded by the end of the first decade. This indicates that about 92 percent of the currently unroaded lands on the Forest would still be roadless at the time of the next Forest Plan Revision, when their potential as Wilderness may be considered again.

Table 3-99

Allocation of total roadless area (9,631,053 acres) to LUD's by alternative

Land Use Designation	Alternative A	B	C	D	P
Natural Setting Grouping					
Research Natural Area	48,395	48,615	37,315	27,344	34,614
Other Area	32,996	34,636	0	42,755	128,678
Special Interest Areas	109,191	126,440	7,533	20,125	112,259
Primitive Recreation	3,898,909	3,962,266	3,100,505	1,922,460	2,809,609
Enacted Municipal Watersheds	9,514	9,514	9,514	9,514	9,514
Old-Growth Habitat	661,394	17,352	364,618	16,937	245,584
Semi-Primitive Recreation	1,398,461	1,481,598	518,885	2,569,015	1,192,284
LUD II	703,178	703,178	703,178	703,178	703,178
Wild, Scenic or Recreation River	278,053	163,164	0	47,306	87,374
Beach Fringe and Estuary	158,911	120,985	266,966	0	182,763
Total Remaining in a Natural Setting	**7,299,002**	**6,820,563**	**5,008,514**	**5,578,294**	**5,505,857**
Moderate Development Grouping					
Stream and Lake Protection	196,798	257,945	436,299	0	386,433
Fish Habitat & Water Quality Requirements	0	0	0	396,567	0
Experimental Forest	6,974	6,974	13,421	6,974	6,974
Scenic Viewshed	632,127	753,103	552,095	204,700	684,778
Modified Landscape	837,787	538,007	1,105,606	402,783	1,061,133
Subtotal	**1,673,686**	**1,556,029**	**2,107,421**	**1,011,024**	**2,139,318**
Intensive Development Grouping					
Timber Production	504,776	1,252,047	2,350,081	3,114,101	1,830,656
Total Moderate and Intensive Development	**2,178,462**	**2,808,076**	**4,457,502**	**4,125,125**	**3,969,974**

Effects of Alternatives

The roadless lands allocated to natural setting land use designations will remain roadless for the life of this revision (10-15 years), therefore there will be no effect on roadless values unless a vital transportation linkage or major utility system is proposed (see Long-term Sale Boundaries, Timber Sale Schedule, and Transportation and Utility Corridor map in the map packet for potential locations). Should any major road or power transmission corridor study be undertaken, appropriate site-specific environmental analysis would occur. At this time, the Juneau-Haines corridor, Taku River corridor, and the East Bradfield Canal corridor are the most likely road corridors to receive further study by the State of Alaska.

Those roadless lands within moderate and intensive development land use designations would change over time. The amount of acreage that would change from a roadless to a "roaded" status by alternative is estimated in Table 3-100.

Table 3-100

Current roadless acreage within moderate and intensive development Land Use Designations that would likely change to "Roaded" after 10, 20, and 50 years by Alternative [1]

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative P
After 10 Years	444,800	515,200	720,000	729,600	656,000
After 20 Years	883,200	1,024,000	1,446,400	1,481,600	1,318,400
After 50 Years	1,299,200	1,523,200	2,157,000	2,160,400	1,955,200

[1] Based on the assumption that new road construction would change the land from a roadless category to a "roaded" category for those lands within 1/4 mile either side of the road.

In Alternative A, 7,299,002 roadless acres (or 76 percent of the currently remaining roadless areas) are allocated to natural setting land use designations and would remain essentially in their natural condition; 2,178,462 roadless acres are allocated to the moderate and intensive development land use designations where roads and other development would occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 114,600 acres and would construct about 1,390 miles of road. Over 150 years, Alternative A would schedule harvest on about 1,173,000 acres and would construct a cumulative total of about 5,200 miles of road in the moderate and intensive development land use designations.

If Alternative A was implemented, roadless areas may also lose their potential for future consideration as Wilderness as a result of fragmentation by the 5,200 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative A would affect the wilderness potential on about 1,299,200 acres at the end of 50 years of plan implementation, with most of the effect occurring during the first two decades. Alternative A has the least adverse effect on the roadless resource of any of the alternatives.

In Alternative B, 6,820,563 roadless acres (or 71 percent of the currently remaining roadless areas) are allocated to the natural setting land use designations and would remain essentially in their natural condition; 2,808,076 roadless acres are allocated to the moderate and intensive development land use designations where roads and other development may occur over time.

By the end of the first decade, Alternative B would schedule timber harvest on about 131,200 acres and would construct about 1,600 miles of road. Over 150 years, this alternative would schedule harvest on about 1,360,000 acres and would construct a cumulative total of about 6,300 miles of road in the moderate and intensive development land use designations.

If Alternative B was implemented, roadless areas may also lose their potential for future consideration as Wilderness as a result of fragmentation by the 6,300 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative B would affect the wilderness potential on 1,523,200 acres at the end of 50 years of plan implementation, with most of the effect occurring during the first two decades. Alternative B has adverse effects on the roadless resource similar to Alternative A.

In Alternative C, 5,008,514 roadless acres (52 percent of the currently remaining roadless areas) are allocated to the natural setting land use designations and would remain essentially in

their natural condition; 4,457,502 roadless acres are allocated to the moderate and intensive development land use designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 169,000 acres and would construct about 2,250 miles of road. Over 150 years, this alternative would schedule harvest on about 1,732,000 acres and would construct a cumulative total of about 8,800 miles of road in the moderate and intensive development land use designations.

Roadless areas may also lose their potential for future consideration as Wilderness as a result of fragmentation by the 8,800 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative C would affect the wilderness potential on about 2,157,000 acres at the end of 50 years of plan implementation, with most of the effect occurring during the first two decades. Alternative C would likely have a significantly higher adverse effect on the roadless resource than Alternative A or B and slightly higher affect than Alternative P, but less than Alternative D.

If Alternative D were implemented, 5,578,294 roadless acres (or 58 percent of the currently remaining roadless areas) are allocated to the natural setting land use designations and would remain essentially in their natural condition; 4,125,125 roadless acres are allocated to the moderate and intensive development land use designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 172,300 acres and would construct about 2,300 miles of road. Over 150 years, this alternative would schedule harvest on about 1,818,000 acres and would construct a cumulative total of about 9,000 miles of road in the moderate and intensive development land use designations.

Roadless areas may also lose their potential for future consideration as Wilderness as a result of fragmentation by the 9,000 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative D would affect the wilderness potential on about 2,160,400 acres at the end of 50 years of plan implementation, with most of the effect occurring during the first two decades. Alternative D would likely have a significantly higher adverse effect on the roadless resource than Alternative A or B and slightly higher effect than Alternatives C and P.

If Alternative P were implemented, 5,505,857 roadless acres (or 57 percent of the currently remaining roadless areas) are allocated to the natural setting land use designations and would remain essentially in their natural condition; 3,969,974 roadless acres are allocated to the moderate and intensive development land use designations where roads and other development may occur over time.

By the end of the first decade, this alternative would schedule timber harvest on about 155,700 acres and would construct about 2,050 miles of road. Over 150 years, this alternative would schedule harvest on about 1,601,000 acres and would construct a cumulative total of about 8,000 miles of road in the moderate and intensive development land use designations.

Roadless areas may also lose their potential for future consideration as Wilderness as a result of fragmentation by the 8,000 miles of new roads, other development, and where remaining undeveloped portions are reduced to less than 5,000 acres. Overall, Alternative P would affect the wilderness potential on about 1,955,200 acres at the end of 50 years of plan implementation, with most of the effect occurring during the first two decades. Alternative P would likely have a significantly higher adverse effect on the roadless resource than Alternative A or B and lower than Alternative C or D over a 150-year period.

Soils

Affected Environment

Changes Since the DEIS

There have been no changes to the Soils Affected Environment section since the DEIS, other than the addition of a discussion of scientific methodology. Modifications have been made to the Environmental Consequences section to further discuss erosion and soil productivity. Geozones are no longer used as a unit for the estimation of effects.

Background

Over 100 different kinds of soils have been identified in the Tongass National Forest, the largest forest in the National Forest system. Soils in Southeast Alaska develop in parent materials originating from a variety of geological or vegetative sources. (Parent material is the inorganic (mineralized) or organic (mostly vegetative) matter in which soils develop.) Parent materials include volcanic ash, glacial deposits, colluvium, stream and uplifted marine sediments, and deposits of decomposed plant materials. The glacial deposits, colluvium and sediments are derived from many different kinds of igneous, sedimentary and metamorphic rocks.

Soils are commonly divided on the basis of parent materials into mineral and organic soils. Both occur extensively in the Forest. Sixteen percent of the inventoried land surface area of the Tongass consists of ice, exposed bedrock, and bodies of water: the balance is either mineral or organic soil.

Mineral Soils

The mineral soils originate from deposits of glacial material, colluvium and residual materials from sedimentary, metamorphic, and igneous rock. Glacial materials are found in U-shaped, glaciated valleys and lowland areas, and are extensive up to 1500 feet in elevation. Parent material from postglacial ash and pumice are found extensively only on Kruzof, northern Baranof, and southern Chichagof Islands. Extensive areas of marine sediments are located on the northern half of the Forest, while small isolated terraces have been located up to elevations of 500 feet throughout other parts of the Forest.

Spodosols, the dominant mineral soils of the Forest, are soils that have several layers (spodic horizons) in which iron, aluminum, and organic matter have accumulated. Mineral soils account for 7.87 million acres (62 percent) of the total soils mapped on the Forest. Most mineral soils have thick (4-10 inch) surface organic horizons, are acidic (pH 3.0-6.4), have weak structures, are wet or continually moist, and have low clay content. Soil depths range from less than 20 inches to more than 20 feet. Soils range from well to very poorly drained. Due to their often thick organic surface layers, these soils have high infiltration rates. Surface runoff occurs only locally, or in barely definable ephemeral channels. These soils remain wet year-round.

Organic Soils

Composed of dead and decomposing plant parts, organic parent materials are generally found on poorly drained glacial materials and marine sediment deposits. The Forest's cool temperature and moist conditions prevent vegetation from decomposing quickly. This results in extensive organic material accumulation.

Organic soils, or Histisols, in the Southeast Alaska environment, support either forest and/or herbaceous vegetation. Organic soils that support open areas of herbaceous vegetation are referred to as muskegs. Forested organic soils may be either well or poorly-to-well drained.

Those that are poorly drained are sites of scrubby or reduced forest growth. Well-drained organic soils support forests of western hemlock, or western hemlock intermixed with cedars and Sitka spruce. Organic soils account for 2.87 million acres (22 percent) of the total area of the soils mapped on the Forest.

Organic soils are widely distributed throughout the Forest. They are found from alpine to sea level. They occur on hills, ridgetops, valley bottoms, mountain slopes with considerable gradient, and glacially-scoured benches and depressions on mountains and hills. They range from just three inches to well over 40 feet deep.

One of the most important characteristics of organic soils is their great capacity for taking up and holding water, acting somewhat like a sponge. Because the soils are typically poorly to very poorly drained, they are often wet or saturated with water most of the year. Muskegs contain surface water most of the year, while coniferous forests with poorly drained organic soils typically have water tables five to ten inches below the surface of the duff layer.

High water tables in poorly drained organic soils allow little storage capacity for additional water from either rain or snow. Consistently, most of the precipitation falling on muskegs rapidly runs off the surface, and only the amount needed to recharge the water table infiltrates the soil. The exception to this is during dry periods of two or more weeks. During these periods, water tables in all organic soils are lowered by subsurface drainage. Even though dry periods of four weeks or more may occur, the subsoils of these poorly drained soils never become dry.

Organic soils supporting coniferous forests have thick organic duff layers over bedrock or organic subsoils. Surface runoff does not occur on these soils, as it does in muskegs, because the organic duff surface is able to absorb all precipitation, and these organic soils are on landforms that allow better subsurface drainage than landforms associated with muskegs.

Soil Productivity

Soil, and its productivity, is very important since it also affects the productivity of most other forest resources. Tree growth, wildlife and fish habitat, and recreation opportunities are often associated with soil quality. Soil productivity presently receives the most interest and concern through the management of old and second-growth timber. In Southeast Alaska, productivity of mineral soils, in terms of tree growth, ranges from very high on floodplains, till plains, and most other lowlands, to progressively lower as latitude or elevation increase, and on more poorly drained soils. Productivity on poorly and very poorly drained organic soils, regardless of elevation or northern extent, is generally much lower than the productivity of mineral soils.

Soil, or site, productivity is generally measured by the rate of biomass accumulation. Because forest production is often difficult to measure, site index is commonly used to give a relative indication of soil or site productivity. Site index is the tree height of dominant trees at a specified age. The site index tables or curves used in Southeast Alaska were developed from trees in even-aged stands, but uneven-aged or old-growth stands predominate in Southeast Alaska. Therefore, there are few satisfactory sites for determining site index (Stephens, et al., 1968). Even-aged stands of natural regeneration in previously logged areas are just now beginning to produce potential site indexes in second-growth stands. In addition to site index, research scientists are studying the effect of tree spacing on stand productivity.

Soil productivity can be predicted reasonably well from soil type characteristics. Soil drainage and soil depth are responsible for the greatest difference in forest productivity in Southeast Alaska. Stephens, Gass, and Billings (1968) reported that for determining site index, timber-producing soils of Southeast Alaska could be grouped into seven categories based on soil

drainage and soil depth. Ford, Farr, and Ping (1988) found that out of four soil characteristics only coarse fragment content was significantly related to site index for Sitka spruce. Cullen (1987) found that of eight soil and four landform characteristics used to predict timber volume, soil drainage class described the greatest difference in productivity, and soil depth described the second greatest difference. Although soil depth, coarse fragment content, and drainage reflect the influences of other site factors, these characteristics best relate to timber growth according to these studies. Table 3-101 shows the relationship of productivity to soil characteristics.

Erosion, Sedimentation, Mass Movement

Soil erosion in the form of gullies, sheet, or rill erosion is very minor in soils under natural, undisturbed conditions in Southeast Alaska. Under these conditions, the thick surface duff layers that cover the mineral soils protect soil from surface erosion. Mineral soils can be disturbed and exposed either by natural causes, such as landslides, or management activities, such as timber harvest and road construction. Surface erosion becomes active once the duff layer is removed and until revegetation occurs. Revegetation may be human-assisted (grass seeding and fertilization is usually required by road construction contracts) or natural. In either case, maximum sediment production occurs within the first five years after exposure, returning to background levels in approximately 10 years. Naturally-occurring and land management-initiated landslides (soil mass movement) dominate the erosion processes on steep forest lands in Southeast Alaska.

Table 3-101

Soil Characteristics related to soil productivity-timber site index

Soil Characteristics	Productivity-Timber Site Index Adjective	Productivity-Timber Site Index Numerical
Greater than 10 inches deep[1] Well & moderately well drained, nonskeletal.	High	>80[2]
2-10 inches deep[1] Well & moderately well drained, skeletal; somewhat poorly drained, non-skeletal & skeletal; poorly drained, skeletal.	Moderate	41-80
Less than 2 inches deep[1] Well & moderately, drained, skeletal & non-skeletal.	Poor	<40
Poorly & very poorly drained Any depth, non-skeletal.	Poor	<40

[1] Soil depth is measured from the surface of the mineral soil.

[2] Site index is based on 50 year-old stands.

The principal effects of landslides are on streams and on soil productivity. Although few in number, landslides entering streams deposit an initial large mass of sediment, and then provide a persistent source of stream sedimentation until the slide area revegetates (usually within five to ten years). Landslides deliver eroded material to streams more efficiently than surface erosion, and can also be an important source of new material for spawning gravels for fish. Little is documented or understood about the total impact of sediment from eroded soils being routed through streams in Southeast Alaska and its persistence in them. Research is presently being conducted by the Forest Sciences Laboratory to quantify sediment movement and its

affects. Landslides seriously retard soil productivity for forest regeneration by first removing the soil mantle down to bedrock or to glacial till on upper slopes, and then depositing the debris over productive soils on lower slopes and valley bottoms (Harris, 1967). It takes 50 to 100 years for the nitrogen and organic soil layers to be rebuilt.

A broad-level photo reconnaissance of landslides greater than 77 cubic meters in timber harvest areas occurring over the last 20 years (1963-83) in Southeast Alaska, provides present preliminary Forest-wide data on landslide type, frequency, distribution, and general relations to harvest activities (Swanston, unpub., 1989). A total of 1,395 landslides were not identifiable on 1962 photos. Each of these landslides was assumed to have occurred within the 20 years since 1963, a period essentially covering the development of large-scale clearcutting in Southeast Alaska. Total landslide acreage accounts for less than one percent of the Tongass National Forest that was inventoried.

Of the total landslides, 118 (or about nine percent) occurred in clearcut areas or were directly associated with timber harvesting and 1,277 landslides (about 91 percent) occurred in unlogged areas. When compared on a per acre bases, landslides were approximately one per 2,240 acres on logged areas compared to one per 7,470 acres on unlogged areas. Landslides occurring on clearcut areas are about three times as frequent as those on unlogged areas. Although this threefold increase on logged areas seems large, it accounts for only 0.2 percent of the 366,290 acres logged on the Forest. The inventory data suggests that landslides are slightly more frequent on logged and unlogged areas on the northern Tongass than they are on the southern Tongass.

Landslides on unlogged areas appear to be larger and longer than those occurring in logged areas. Swanston's data indicates that 3.2 percent of the total landslides impact fish streams, with 0.5 percent from logged areas and 2.7 percent from unlogged areas. Therefore, the total number of landslides impacting fish streams is very small. Of the 1,277 landslides occurring on unlogged areas, 37 (about three percent) impacted fish streams, while about six percent of the 118 landslides occurring on logged areas impacted fish streams.

Methodology and Scientific Accuracy

Methodology for the Soil Resource Inventories (SRI's) included examining, describing, and classifying soils, and delineating their areas on colored or black and white aerial photography in the field. The essential elements of the SRI's were adjusted to provide the most useful product for the principal purposes of Forest and project planning. Adjustments in the essential elements produced differentiating orders of SRI's ranging from 2 to 4 to meet management objectives. Soil survey orders identify quality control procedures applied during the inventory which affect the kind and precision of subsequent interpretations and predictions that can be made from this data. General descriptions of Orders 2, 3 and 4 follow.

- Order 2 provides enough detail for project planning such as timber sales, reforestation, grazing, road construction, and some recreation developments; interpretations can be used for project design with field checking.
- Order 3 provides enough detail for Forest-level planning; interpretation can be used for project planning with field verification.
- Order 4 provides adequate detail for Forest-level planning for extensive uses.

Tongass National Forest Order 2 and 3 SRI's are being used for project planning At a minimum, Order 4 SRI's are being used to provide soil data and information for Forest-level planning. Order 4 SRI level information, as a part of the overall data needs, was determined to be adequate for the planning process for evaluating and allocating Forest lands to different land use designations for the Revision. Order 4 SRI's were used for mapping soil on LUD II areas

(about 25 percent of the Tongass National Forest), while Order 2 and 3 SRI's baseline data were used for the remaining 75 percent of the Forest that was mapped. Order 4 SRI data and associated interpretative information needed for Forest planning from the 75 percent of the area that was mapped to Order 2 and 3, was easily compiled from the more detailed Order 2 and 3 Soil Resource Inventory data bases.

The soil data base is the result of Soil Resource Inventories conducted on the Tongass National Forest since the early 1960's. The largest number of acres of SRI's have been conducted since 1978, with the most recent surveys conducted in 1989.

The SRI's on the Tongass National Forest were conducted as part of the National Cooperative Soil Survey (NCSS) process through a Memorandum of Understanding (MOU) between the Soil Conservation Service (SCS) and amended to include the University of Alaska, Agriculture and Forestry Experiment Station. The NCSS is a joint effort by cooperating Federal agencies, land-grant universities and other State and local agencies to map soils, collect soils data, interpret the maps and data, and promote their use.

The SRI's on the Tongass National Forest were conducted in accordance with the standards and directions for soil surveys in the Soil Conservation Service National Soils Handbook, the U.S. Department of Agriculture Soil Survey Manual, Soil Taxonomy, Agriculture Handbook 436 (as amended), and FSH 2509.18, Soil Management Handbook.

Soil Resource Inventories serve as the base for the Common Land Unit (CLU) data base for many other resources and data information used in the Revision. This resource information is either derived from the soil series and Soil Map Units (SMU's), or associated with other resource inventories, such as the plant association data, which are correlated to the soil series and directly dependent on the SMU's for their spatial limits. The following resource data, information or resource values are directly dependent on the SRI base.

- Soil series
- Soil map units (basic map unit)
- Geological parent materials
- Landform
- Plant associations
- Soil Productivity (Site Index — 50 year base)
- Soils' Mass Movement Index
- Soil erosion K-factors
- Hydric soils
- Habitat types
- Maximum and minimum slope gradients of map units.
- Slope classes
- Riparian soil sites
- Wetland systems

Soils

Environmental Consequences

Forest management activities can cause soil erosion through the exposure of mineral soil and can reduce forest soil productivity through the placement of rock material over otherwise productive areas. The management activities that have the greatest potential to affect soil erosion, including sheet, rill, gully or mass movement erosion, are timber harvest-associated activities such as road and log-landing construction, rock pit development, and occasionally yarding activities.

Loss of soil productivity resulting from the construction of roads is unavoidable since roads are constructed from material that is placed directly over the soil, thus taking that land out of production.

Erosion, occurs primarily from landslides, cut banks and to some extent from road surfaces, although most roads in Southeast Alaska are constructed with blasted quarry rock which minimizes road surface erosion. Some portion of the road-related soil erosion is transported in the inside ditches of roads to streams where it may settle out as stream sediment or remain in suspension as water turbidity. (See the section of this chapter on Water for additional information.)

Due to the considerable amount of vegetative groundcover remaining on the harvest units during and following timber harvest, erosion from these areas is usually small. However, in some cases, water-caused soil erosion can occur, especially where poor management practices have exposed extensive areas of mineral soils or where cable yarding has caused trenches in the mineral soils which can concentrate water flow. Wind erosion is practically non-existent on harvest units.

Direct, Indirect and Cumulative Effects

Additional timber harvesting and road building will occur under all alternatives, resulting in accelerated soil erosion. Soil productivity will also be lost or reduced for a period of time. Since each alternative includes a different amount of timber harvest and road construction and use, the alternatives are expected to result in differing levels of soil erosion and soil productivity loss.

Roading

There is little information available on the amount of soil erosion resulting from road construction and use in Southeast Alaska (see this section's discussion of the affected environment). Because of the almost complete lack of quantitative measurements, evaluation of the total area of road disturbance is one of the best measures of the effects of roads. The difference in miles of roads, and acres disturbed by the roadbeds, between alternatives is an indicator of how the potential site-specific effects may differ. These site-specific effects must be evaluated more precisely during project planning, based on the specific conditions found at the project site. These effects will vary based on the parent material of the soils of the land surface, the slope and location within the watershed on which the road may be built, the mass movement hazard of the soils, the quality of the surfacing material used, and the projected use of the road.

The number of miles of road to be constructed is included in the Transportation section of the chapter. The acres of roads resulting from the road miles, including the cumulative total number of acres of land anticipated to be directly affected by the roads, is shown by alternative for the first, fifth and tenth decades following implementation of an alternative (Table 3-102).

Table 3-102

Cumulative roaded acres by alternative for the first, fifth and tenth decades after implementation[1]

Alt.	1990 Roads	Decade 1 Proposed	Decade 1 Cumulative	Decade 5 Proposed	Decade 5 Cumulative	Decade 10 Proposed	Decade 10 Cumulative
A	10,065	4,062	14,127	11,724	21,789	15,450	25,515
B	10,065	4,728	14,793	13,791	28,856	18,756	28,821
C	10,065	6,621	16,686	19,971	29,775	26,466	36,531
D	10,065	6,705	16,770	19,668	26,733	27,120	37,185
P	10,065	6,036	16,101	17,862	29,927	23,961	34,026

Source: FORPLAN road mile data, June 1991, adjusted for acres at the ratio of 3 acres for each mile of road.

[1] "Proposed" refers to the acres of land that are anticipated to be affected by roads from the beginning of revised plan implementation to the end of the decade shown in the column heading. "Cumulative" includes the acres in the proposed column plus the acres of currently existing road acres (1990).

As of 1990, the total area directly disturbed by roads is estimated to be 10,065 acres, or 0.65 percent of the total roaded portion of the Forest (areas considered roaded total 1.54 million acres; see the Roadless section of this chapter). The total area disturbed by roads for each of the alternatives is shown in Table 3-102. The percent of the roaded land base in road surface (at the end of the 15th decade) is 0.9 for Alternative A, 0.9 for Alternative B, 1.1 for Alternative C, 1.0 for Alternative D, and 1.0 for Alternative P.

As shown above, the acres of land disturbed by roads in each alternative is very low. However, in an individual watershed, especially those with a large proportion of suitable timber, the percentage of lands that could be in a disturbed state due to timber harvest may be considerably higher. Analysis of site-specific effects for individual project locations will be done during the project planning phase of environmental analysis.

Roads, including the road prism, inside ditch, cut bank and side cast fill, disturb approximately three acres for each mile of road constructed. On these acres soil productivity is essentially lost for timber or other vegetation which occurred at the site prior to road construction. Using the maximum cumulative road acres projected for any alternative (Alternative D at the 10th decade; see Table 3-102), there could be approximately a 0.2 percent reduction Forest-wide in lands with productive forest soils. For lands projected for development in the moderate or intensive land use designations, the reduction would 0.7 percent. All other alternatives impact the productive forest lands by less than the 0.2 percent of Alternative D.

Landslides

Landslides, which cause mass soil movement in the form of slump-earthflows, debris avalanches, debris flows and debris torrents, constitute the most damaging type of erosion (Swanston, 1980). Of all the forms of erosion, landslides are thought to be the major cause of accelerated erosion resulting from management-associated activities. Landslides affect soil quality and quantity, and have the potential to affect aquatic habitats.

Landslides move soil from steep upper slopes to lower slopes. Soil loss from the upper slopes diminishes productivity, and the exposed soils or landslide materials serve as sites of accelerated rill, sheet or gully erosion. Accelerated erosion in the form of sheet, rill or gully erosion is secondary in importance to the impact caused by an initial landslide occurrence.

Projecting the frequency of landslides resulting from management activities based on past occurrences indicates the loss of soil productivity that could take place by alternative. Swanston (1989) showed in an inventory of landslides that occurred over a 20 year period (1963-1983) that 118 landslides, or about nine percent, were located in clearcut areas or were directly associated with timber harvesting activities. This equals approximately one landslide for every 2,240 acres harvested. This inventory information is used to project the potential number of landslides related to future timber harvesting. Since the actual location of timber harvest units is unknown, the projection is based on the average annual timber harvest for the first decade, and cumulatively for the second, and the first through the fifth decades. This information is presented in Table 3-103 by alternative.

In predicting the future rate of landslides resulting from management activities, the following mitigating measures, which should reduce the projections based on Swanston's inventory data, should also be considered:

1. All Class I streams, and Class II streams which flow directly into Class I streams, are protected by minimum 100-foot buffers within which no commercial timber harvest is allowed (Tongass Timber Reform Act of 1990). Other Class II streams and all Class III streams, depending on channel type, will also be buffered as required by the appropriate riparian management land use designation (Stream and Lake Protection in Alternatives A, B, C, and P; Fish Habitat and Water Quality Requirements in Alternative D). Water quality, and the beneficial uses of water, are protected in all alternatives, and for all stream systems, through the application of Best Management Practices (see the Water section of this chapter, and a summary of the Best Management Practices in Appendix C of the Proposed Revised Forest Plan). The use of buffers, and the application of Best Management Practices and Forest-wide standards and guidelines, should minimize landslides in areas with management activities.

2. All areas with soils having a "very high" mass movement index have been removed from the suitable timber base. This prevents commercial timber harvest and associated activities from occurring in areas with the highest potential risk for accelerated landslide occurrence. However, to meet timber volume objectives in later decades (following the third to fourth decade after revised plan implementation), more than the historical level of road construction and timber harvest may be done on moderate to steep slopes with a "high" mass movement index and with a timber operability rating of difficult.

3. Soil Conservation Practices, as well as applicable Best Management Practices, will be applied to meet soil quality standards (Soil and Water Conservation Handbook, FSH 2509.18).

The actual frequency of landslides that may occur cannot be predicted. If the above assumptions hold true, then the frequency of landslides will be minimized, especially of those of the kind inventoried by Swanston that have an initial release volume of 100 cubic yards or more. Since no other up-to-date data or information representing Forest-wide conditions other than Swanston's is available, we can only project that accelerated landslide frequency may be less but could also be nearly the same frequency as reported by him. The main difference that will probably be seen in landslide frequency in the future is a reduction in landslides with 100 cubic yards or more in initial release volume, and fewer landslide occurring on the steep sides of Class II and Class III streams because of the emphasis placed on stream riparian management.

Applying Swanston's inventory information, the expected frequency of landslides occurring within future timber harvested areas can be calculated. For the first five decades, Alternative A

could result in approximately five accelerated landslides per year, or 255 in fifty years. Alternatives B and P could result in approximately six and seven per year, respectively, or 285 and 360, respectively, in fifty years. Alternatives C and D could result in approximately eight per year, or 400 in the fifty-year period. Cumulative frequencies of landslides on a per-decade basis are presented in Table 3-103.

Table 3-103

Average annual timber harvest acres and projected annual and cumulative total number of landslides by Alternative

Alt.	Unit of Measure	Decade 1	Decade 2	Decades 1-5
A	Annual Acres Harvested	11,464	11,353	11,945
	Projected Annual Number	5.1	5.0	5.1
	Cumulative Total Number	51	102	255
B	Annual Acres Harvested	13,119	12,925	13,756
	Projected Annual Number	5.8	5.8	5.7
	Cumulative Total Number	58	116	285
C	Annual Acres Harvested	16,900	17,546	17,974
	Projected Annual Number	7.5	7.8	8
	Cumulative Total Number	75	156	400
D	Annual Acres Harvested	17,235	18,217	18,654
	Projected Annual Number	7.6	8.1	8.3
	Cumulative Total Number	76	162	415
P	Annual Acres Harvested	15,568	16,365	16,523
	Projected Annual Number	7.0	7.3	7.2
	Cumulative Total Number	70	146	360

Source: Revision FORPLAN Reports June 1991; based on the landslide rates calculated by Swanston (1989) for areas harvested 1963-1983.

The land area covered by the landslides is not large, as a percentage of the acres of timber harvested for the same period. Loggy (1974), in an inventory of a portion of Prince of Wales Island, reported that 328 inventoried landslides ranged in size from one acre to 15 acres. The average size for the landslides inventoried was five acres. Multiplying Swanston's inventory data of 118 landslides times five acres results in approximately 590 acres or 0.22 percent of the harvested lands (264,332 acres) having lost or reduced soil productivity as a result of landslides. If these 118 landslides are added to the maximum projected landslides (400) in Alternatives C and D (Table 3-103), then approximately 2,600 cumulative acres of soil productivity could be lost or reduced by the end of the 5th decade of revised Plan implementation. These landslide acres would be approximately 0.27 percent of the 964,000 acres harvested by the end of the fifth decade. Loggy (1974) found that 39 landslides totaling 185 acres were the direct or indirect result of timber harvest activities on 22,650 acres of timber-harvested areas. These 39 landslides accounted for 0.8 percent of the logged area.

Some of the difference in the above percentages can be contributed to the following:

1. Loggy's inventory was conducted in an area known to have a higher concentration of landslides (Swanston 1969), and landslides of smaller size were inventoried than the 100 cubic yard landslides reported by Swanston in 1986.
2. Those reported by Loggy occurred in the 1960's and up to 1972 prior to the development and application of Soil Conservation Practices and Best Management Practices in the mid and late 1970's.
3. Those landslides reported by Swanston (1986) included many of those inventoried by Loggy and included some both with and without the application of Soil Conservation Practices and Best Management Practices.

It is not possible to determine which of the factors had the most influence on the differences in area impacted by the landslides. If the assumptions presented in this section hold true, then the initiation and occurrence of landslides on a Forest-wide bases should be the same or less than the present level of landslide reported by Swanston.

Overall, the greatest risk of impacts from soil erosion and lost soil productivity will be in Alternatives C and D, while Alternative A would have the lowest risk.

Mitigation

Forest-wide standards and guidelines for the soils resource are used in all alternatives (see Proposed Revised Forest Plan, Chapter 4). These standards and guidelines provide direction for managing the soil resource, and for reducing potential effects on the soil resource from land-disturbing management activities. The standards and guidelines are designed to minimize accelerated soil erosion and to maintain the inherent long-term soil productivity within the levels of the Soil Quality Standards (FSH 2509.18). The standards and guidelines also include soil conservation practices and refer to the Best Management Practices applicable to soils (see Appendix C of the Proposed Revised Forest Plan). These practices are used to protect soil quality while managing for other resources goals and objectives.

Soil quality standards are established limits of disturbance which will provide reasonable assurance that inherent long-term soil productivity is maintained over the total area of ground surface impacted by an activity. They represent the maximum tolerable disturbance levels, and combine the "threshold" values for the severity of soil property alteration with the extent of the area of disturbance.

The minimum soil quality standard requires 85 percent of an area to be maintained in a condition of acceptable productivity for trees and other managed vegetation following land management activities. (Specified roads and log transfer facilities are excluded from the area of concern.) A minimum percentage of effective ground cover, an important characteristic relating to the productivity potential, is also required to be maintained following the cessation of disturbance in an activity area. The minimum percentage increases as slope gradient increases. The effective ground cover must be at least 85 percent on slopes less than 35 percent, 90 percent on slopes from 35-75 percent, and 95 percent on slopes greater than 75 percent. Other standards and guidelines for soil quality are included in FSH 2509.18 (Region 10 supplement).

Special Interest Areas

Affected Environment

Changes Since the DEIS

Fourteen potential Special Interest Areas, identified since the DEIS, are described and addressed.

Background

Special Interest Areas (SIA's) are areas possessing unique or unusual scenic, historic, prehistoric, scientific, natural or other characteristics. The objective of designating and managing such areas is to protect their unique values and, where appropriate, to foster public use and enjoyment of these areas. Special Interest Areas may be designated as scenic, recreation, historic, archaeological, geological, botanical, zoological or paleontological areas. Special Interest Areas differ from Research Natural Areas in that they may promote public use as well as scientific study.

Special Interest Area designations maintain natural to near-natural conditions in specific areas. The resources contained within these areas are not available for development, except for public use facilities designed to allow recreation use while protecting the values of the area, or for interpretation and scientific study. Each area may require unique management direction determined through individualized study and planning. The land use designation for Special Interest Areas applies to all the designated areas.

Seven Special Interest Areas have been previously designated within the Tongass National Forest. These are:

- Mendenhall Glacier Recreation Area (5,791 acres)
- Ward Lake Recreation Area (440 acres)
- Walker Cove-Rudyerd Bay Scenic Area (93,540 acres)
- Admirality Lakes Recreation Area (8,710 acres)
- New Eddystone Rock Geological Area (one acre)
- Hubbard Glacier Geological Area (46,000 acres)
- Tracy Arm-Fords Terror Scenic Area (283,000 acres)

The Tongass also contains a small portion of the five-acre Fort Durham National Historic Landmark (most of which is on private land).

Three of these existing Special Interest Areas were originally designated to recognize and protect scenic and recreation values associated with their unique natural settings. Since these designations, the three areas have been included within Wildernesses and/or National Monuments. They are:

- Walker Cove-Rudyerd Bay (Misty Fiords National Monument and Wilderness)
- Admiralty Lakes (Admiralty Island National Monument and Kootznoowoo Wilderness)
- Tracy Arm-Fords Terror (Tracy Arm-Fords Terror Wilderness)

Since the National Monument and Wilderness designations recognize and protect the same values for which the areas were originally designated, the Special Interest Area designation may have become redundant, and the possibility of declassifying these areas as Special Interest Areas is being explored by the Forest Service. No proposals for declassification are being made at this time.

Potential Special Interest Areas

An analysis of areas suggested in public comments or identified internally has led to a list of fourteen potential Special Interest Areas to be evaluated in this Supplement. Following is a list of these areas, with brief descriptions. Appendix F includes more detailed descriptions of each area, and a general location map.

Clear River Zoological Area

This 11,970 acre area is located on central Baranof Island. It includes an alpine/sub-alpine ecosystem with a high-density mountain goat population, and a unique estuary where a glacial and a non-glacial river converge. Since the mountain goat population is an introduced one, the area offers excellent opportunities for research.

Fish Creek Hot Springs Recreation Area

This 100-acre hot springs area is located on Baranof Island north of Sitka and is used by local residents. Recreation facilities and better access could improve the recreation use and help protect the integrity of the springs.

Mt. Edgecumbe Geological Area

Mt. Edgecumbe, an extinct volcano, is located on the southern half of Kruzof Island, across the bay from Sitka. Volcanic activity occurred since the last ice age and spanned several thousand years, leaving South Kruzof Island with many unique volcanic formations. South Kruzof is a popular recreation area and Mt. Edgecumbe an outstanding scenic attraction. The Special Interest Area would include all of south Kruzof Island, an area of 41,540 acres.

Pike Lakes Recreation Area

This 1,640 acre area located east of Yakutat has ecological features that make it unique from the surrounding Yakutat Forelands. It is the only portion of the Forelands area to escape the most recent period of glaciation. The Pike Lakes area contains many excellent fishing lakes, and has the only known natural population of Northern Pike in Southeast Alaska.

Blind Slough Scenic and Zoological Area

This 8,530 acre area is located on Mitkof Island south of Petersburg. The area has an ecosystem unique to Southeast Alaska, with a combination of alpine, estuary, wetland and marsh habitats that provide for a rich and diverse bird population. It also has several popular developed recreation sites and offers many recreation opportunities in a setting of outstanding scenery, with 3,300-foot Crystal Mountain the dominant feature.

Keku Islets Geological and Scenic Area

The Keku Islets are located just off the northeast shore of Kuiu Island. The Special Interest Area, including a small portion of Kuiu Island at the tip of Saginaw Bay, comprises approximately 1,060 acres. The islands are rich in Native Alaskan history and have an interesting geology, with many limestone formations and caves. The islands provide safe anchorages and have good recreation potential.

North Hamilton River Red Cedar Cultural and Botanical Area

This 80-acre stand of trees, with an unusually high proportion of red cedar for this latitude, is located on Kupreanof Island southeast of Kake. Native Alaskans use this cedar for woodcarving and other cultural and subsistence uses. The proposed Special Interest Area would be managed for the continuation of these uses.

Patterson Glacier Geological and Botanical Area

The 7,400-acre Patterson Glacier area is located on the mainland, southeast of Thomas Bay and northeast of Petersburg. The glacial history of the area includes outstanding examples of plant succession (from bare ground to old growth) within a short horizontal distance, and other interesting glacial-related features. Many opportunities for study of natural phenomena exist here.

Arena Cove/Cape Felix Geological Area

This 9,260 acre area is located on the south side of Suemez Island, to the southwest of the Prince of Wales Island town of Craig. It includes volcanic rocks and formations, including a 2,145-foot volcanic peak whose cliffs and scree slopes descend dramatically seaward to Cape Felix. The area was possibly used as a prehistoric source of obsidian. Arena Cove is a popular recreation area with local residents, as well as an important subsistence bay.

Bailey Bay Hot Springs Recreation Area

Bailey Bay is located on the upper portion of the Cleveland Peninsula, on the north side of Behm Canal. A trail leads 2.2 miles to the hot springs which have not been altered significantly for recreation use (a rarity in Southeast Alaska), although there is a shelter at the site. The springs have the highest surface temperature of any known springs in Southeast Alaska, and represent a good opportunity for study of hot springs flora. The size of the proposed Special Interest Area is 1,680 acres.

Blue River Lava Flow Geological Area

Blue River flows into the Unuk River in the northern-most corner of Misty Fiords National Monument. This 9,500 acre area includes the remains of a lava flow which moved down the Lava Fork and Blue River valleys (starting from inside Canada), creating Blue Lake and temporarily damming the Unuk River (which has since carved a channel through the lava). The area is rich in volcanic history, and the flow is the youngest known in Southeast Alaska. It offers excellent opportunities for studying weathering and plant succession, and may also possess a significant cave resource.

Karst Areas Geological Area

Twelve separate areas with significant cave resources, totaling about 13,100 acres, make up this Special Interest Area. The areas are located on north Prince of Wales Island (four sites near or including Mount Calder, and El Capitan, Perue and North Perue Peaks) and on northwest Dall Island (eight sites). "Karsts" are limestone areas in which erosion has created fissures, sinkholes, underground streams and caves. Recent surveys of the cave resource on north Prince of Wales Island have yielded 30 mapped caves so far (20 of which are within the Special Interest Area) including the deepest known natural pit in the United States (625 feet total depth). The Dall Island karst areas have not yet been surveyed.

Soda Springs Geological Area

Soda Springs is an 1,800 acre area located at the head of Soda Bay near Hydaburg on Prince of Wales Island. It contains a number of carbonated springs with unique tufa (porous rock) deposits. Local residents collect the carbonated water for drinking.

Ward Lake Recreation Area (expansion)

This is a proposed expansion of the existing Ward Lake Recreation Area, located just north of Ketchikan. The existing area of 440 acres, which includes three campgrounds and Ward Lake, would be expanded to 6,500 acres. The expansion would include other existing recreation developments (several trails and a campground) and several lakes with additional recreation potential. Recreation use of the Ward Lake area is substantial and increasing.

In order to protect their unique values, many of the above areas, if designated, would be withdrawn from mineral entry, and some would be closed to off-highway vehicle use. Table 3-104 displays this information.

Table 3-104
Special Interest Area Restrictions[1]

Proposed Special Interest Area	Withdrawn From Mineral Entry?	Closed to ORV Use?
Clear River Zoological Area	No	No
Fish Creek Hot Springs Recreation Area	No	No
Mt. Edgecumbe Geological Area	No	No
Pike Lakes Recreation Area	No	No
Blind Slough Zoological/Scenic Area	Yes	Yes
Keku Islets Geological/Scenic Area	Yes	Yes
North Hamilton River Cultural/Botanical Area	Yes	No
Patterson Glacier Geological/Botanical Area	Yes	No
Arena Cove/Cape Felix Geological Area	Yes	Yes
Bailey Bay Hot Springs Recreation Area	Yes	Yes
Blue River Lava Flow Geological Area[2]	Yes	Yes
Karst Areas Geological Area	Yes	Yes
Soda Springs Geological Area	Yes	Yes
Ward Lake Recreation Area (expansion)	Yes	Partially

[1] Restriction that would apply if the area were designated.

[2] This area is within Misty Fiords National Monument and Wilderness, which is already withdrawn from mineral entry and closed to ORV use.

Other areas may be added to a Special Interest Areas inventory over the planning period. This inventory will include information on an area's environmental and historical values, its relationship with adjacent areas, and an identification of measures and priorities for the protection of unique values. A boundary will be established for each area that includes the unique values, and the area will be protected until a determination of its future status is made. (See Proposed Revised Forest Plan, Chapter 4, "Special Interest Areas".)

Special Interest Areas

Environmental Consequences

Direct, Indirect and Cumulative Effects

Existing Special Interest Areas will be protected from the effects of adjacent management activities under all alternatives. No adverse effects on existing areas are anticipated.

The 14 potential Special Interest Areas described in the affected environment are all recommended for classification under Alternatives A, B and P. Upon approval of the final revised Forest Plan, these areas will be managed under the Special Interest Areas land use designation. Their unique values will be preserved, and opportunities for public and scientific use maintained.

Under Alternative C, none of the areas are recommended, and under Alternative D, two are recommended. Table 3-105 shows the land use designation grouping that each area would be allocated to under these two alternatives.

Table 3-105

Potential Special Interest Area allocations[1] and suitable acres

Potential Special Interest Area	Land Use Designation Grouping Alternative C	Land Use Designation Grouping Alternative D	Suitable Acres[2]
Clear River	Intensive	Intensive	1,040
Fish Creek	Moderate	Intensive	0
Mt. Edgecumbe	Moderate	Moderate	4,870
Pike Lakes	Intensive	Intensive	300
Blind Slough	Moderate	Moderate/Intensive	2,200
Keku Islets	Intensive	Intensive	720
N. Hamilton River	Intensive	Intensive	80
Patterson Glacier	Natural	Special	180
Arena Cove	Intensive	Intensive	4,060
Bailey Bay	Natural	Natural	320
Blue River	Wilderness	Special	0
Karst Areas	Intensive	Intensive	4,980
Soda Bay	Intensive	Natural/Intensive	700
Ward Lake	Natural	Natural/Moderate	1,300

[1] All areas are allocated to the Special Interest Area LUD in Alternatives A, B and P.

[2] Tentatively suitable timberlands (Revision data base, Query 1004).

Areas allocated to natural setting or wilderness LUD's would retain their unique values; these include Patterson Glacier, Bailey Bay, Blue River and most of the Ward Lake expansion. Areas allocated to moderate or intensive development could lose the values for which they have been identified over time as timber harvest and associated road construction occurs. These areas are discussed briefly here:

Clear River. Suitable timberlands in the easternmost portion of the area may be harvested (about 1/10 of the area), but overall the natural character and unique values would be undisturbed.

Fish Creek. The hot springs are a popular recreation use area and would be protected from any harvest activities. The surrounding scenery and setting could change over time.

Mt. Edgecumbe. Moderate development of this area could mean harvest of a relatively small amount of suitable land (about 12 percent). Visual resource requirements would help maintain the scenic and recreational values, and the unique geological features would not be affected.

Pike Lakes. The area contains very little suitable timberland. The recreational values associated with the lakes could be affected by modifications to the surrounding setting.

Blind Slough. Recreational and scenic values would be affected by timber harvest near recreation areas or along the road system. Visual resource objectives would moderate this effect, but less in Alternative D, where about half the area is under the Timber Production LUD. Opportunities for additional recreation developments could be lost. The zoological features (unique ecosystem) are largely associated with lands unsuitable for development, and may not be affected.

Keku Islets. The scenic and recreational features of the narrow islands and mainland strip could be altered significantly by timber harvest.

North Hamilton River. The cedar stands are important cultural features, and Cultural Resource Standards and Guidelines (see Proposed Revised Forest Plan, Chapter 4) would apply if timber harvest were scheduled for this area. Stand integrity could be affected by adjacent harvest or road building.

Arena Cove/Cape Felix. Since they are not associated with suitable timberlands, the area's unique geological features are not likely to be affected by intensive development, but the scenic and recreational qualities of the area may be adversely affected.

Karst Areas. These areas contain a higher percentage of suitable timberland (averaging about 40 percent) than the other large proposed Special Interest Areas, and are assigned the Timber Production LUD in both Alternatives C and D. Areas adjacent to the known caves are likely to be harvested, but the caves (and associated features) themselves would be protected through special standards and guidelines (see Proposed Revised Forest Plan, Chapter 4, "Minerals, Geology, and Caves Standards and Guidelines") designed to implement the Federal Cave Resource Protection Act of 1988.

Soda Springs. The core of the area would be undisturbed under Alternative D (receiving the Primitive Recreation LUD), but surrounding areas, and the entire area under Alternative C, could receive timber harvest and road construction. The unique geological features are not likely to be affected under either alternative, but recreation potential could be reduced.

Classifying some or all of these areas as Special Interest Areas could limit or adversely affect other resource opportunities. (All areas are recommended for classification in Alternatives A, B and P, to which this discussion applies. Alternative C has no recommendations, and of the two areas recommended in Alternative D, one is already within National Monument Wilderness (Blue River), and the other (Patterson Glacier) contains only 180 acres of suitable timberland.) Most of the areas would be withdrawn from mineral entry (see Table 3-104), although none have known mineral reserves of high development potential. About half the areas would be closed to off-highway vehicle (OHV) use. Areas currently popular for OHV use (Mt. Edgecumbe, Patterson Glacier and Ward Lake) would not be closed. Approximately 20,750 acres of tentatively suitable timberlands would not be available (see Table 3-105).

Resource development activities, particularly those associated with timber harvest and mineral development, could adversely affect the unique values of other areas not yet identified as potential Special Interest Areas. The Forest-wide Standard and Guidelines for Special Interest Areas (see Proposed Revised Forest Plan, Chapter 4) include criteria for recognizing and

evaluating such unique features. The potential loss of values is higher for those alternatives with higher timber harvest, road construction and possible mineral development. From highest to lowest, these would be Alternatives D, C, P, B and A.

Threatened, Endangered, Candidate and Sensitive Species

Affected Environment

Changes Since the DEIS

The 21 February 1990 Federal Register announced changes in the status of several Federally listed candidate plant species. These changes are as follows:

- *Thlaspi arcticum* - changed from Category 2 to 3c
- *Aster yukonensis* - Category 2
- *Calamagrostis crassiglumis* - Category 2
- *Carex lenticularis var. dolia* - Category 2
- *Montia bostockii* - Category 2
- *Poa merrilliana* - changed from Category 2 to 3b
- *Poa norbergii* - changed from Category 2 to 3b
- *Cypripedium montanum* - dropped from listing
- *Draba ventosa var. ruaxes* - dropped from listing
- *Gentianella propinqua ssp. aleutica* - dropped from listing
- *Poa laxiflora* - dropped from listing
- *Rhinanthus arcticus* - Category 3b

Information on the four Category 2 plant species is presented. Current work being done by The Nature Conservancy for the Tongass National Forest regarding potential sensitive plant and animal species is discussed.

Biological Assessments prepared by the Forest Service in 1990, and consultations with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) as required by Section 7 of the Endangered Species Act, as amended, are presented in Appendix L. Since preparation of the Biological Assessments, some changes have been made in the standards and guidelines which affect the analysis for marbled murrelets (which are a Category 2 candidate species). The analysis in the Supplement incorporates the changes in the standards and guidelines, amended Biological Assessments have been prepared, and consultations with the USFWS and NMFS are in progress.

Background

Threatened and Endangered Species

Federally listed Threatened and Endangered species are those plant and animal species formally listed by the USFWS or the NMFS, under authority of the Endangered Species Act of 1973, as amended. An endangered species is defined as one which is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as one which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Candidate Species

Candidate species are those being considered for listing as threatened or endangered by the USFWS and NMFS. Candidate species fall into three categories: Category 1 is comprised of species about which the agencies currently have substantial information to support the biological appropriateness of proposing to list them as endangered or threatened. Development

and publication of proposed rules on these species are anticipated. Category 2 comprises species, which information, now in possession of the agencies, indicates that proposing to list as endangered or threatened is possibly appropriate, but on which conclusive biological vulnerability and threat to species data are not currently available to support proposed rules. All Category 3's comprise species that were once considered for listing as endangered or threatened, but are not currently receiving such consideration; these species are either now extinct, no longer taxonomically recognized as a species or subspecies, or are more widespread and abundant than previously thought. Species listed as threatened or endangered are provided statutory protection under the Endangered Species Act of 1973, as amended; candidate species are not provided statutory protection.

State Endangered Species

The State of Alaska has an Endangered Species Law which authorizes the Commissioner of the Alaska Department of Fish and Game (ADF&G) to list Alaska endangered species.

Sensitive Species

Sensitive species are those plant and animal species identified by the Regional Forester whose population viability is a concern on National Forests within the Region. Sensitive species may also be those species whose current populations and/or habitats are reduced or restricted, their habitats and/or populations are considered vulnerable to various management activities, and special management emphasis is needed to prevent the species from becoming threatened or endangered. Identification of sensitive species and emphasis on the management of sensitive species habitat are USDA Forest Service policy and not directly related to Federally designated threatened and endangered species which are protected under the Endangered Species Act. The USDA Forest Service goal for sensitive species management is to ensure that species numbers and population distribution are adequate so that no Federal listing will be required and no Forest extirpation will occur. In January 1990, the Regional Forester approved a process to identify sensitive species on National Forests in Alaska.

Table 3-106 summarizes threatened, endangered, candidate and sensitive species which occur on or adjacent to the Tongass National Forest.

Table 3-106

Threatened, Endangered, Candidate and Sensitive Species occurring on or adjacent to the Tongass

	Federally Listed		State Listed	Regional
Animals:	**T/E**	**Candidate**	**Endangered**	**Sensitive**
Humpback Whale	E	-	E	-
Gray Whale	E	-	-	-
Sei Whale	E	-	-	-
Sperm Whale	E	-	-	-
Bowhead Whale	E	-	-	-
Fin Whale	E	-	-	-
Blue Whale	E	-	E	-
Black Right Whale	E	-	E	-
American Peregrine Falcon	E	-	E	-
Arctic Peregrine Falcon	T	-	E	-
Steller (Northern) Sea Lion	T	-	-	-
Plants:				
Thlaspi arcticum	-	3c[1]	-	-
Aster yukonensis	-	2	-	-
Calamagrostis crassiglumis	-	2	-	-
Carex lenticularis var. dolia	-	2	-	-
Montia bostockii	-	2	-	-
Poa merrilliana	-	3b[1]	-	-
Poa norbergii	-	3b	-	-
Rhinanthus arcticus	-	3b	-	-
Animals:				
Glacier Bay Water Shrew	-	2	-	-
North American Lynx	-	2	-	-
Marbled Murrelet	-	2	-	-
Prince of Wales Flying Squirrel	-	3c	-	-
Suemez Island Ermine	-	3c	-	-
Glacier Bear (color phase of black bear)	-	3c	-	-
Osprey	-	-	-	S
Peale's Peregrine Falcon	-	-	-	S
Trumpeter Swan	-	-	-	S
Northern Pike	-	-	-	S
Large Chum Salmon	-	-	-	S
Island Run King Salmon	-	-	-	S

Source: Official correspondence with the U. S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Fish and Game, Federal Register of 6 January 1989, Federal Register of 21 February 1990, Federal Register of 5 April 1990, Federal Register of 4 December, 1990.

[1] Category 3c includes species that are now considered to be more abundant or widespread, and/or substantially less subject to identifiable threats, than previously thought. Category 3b includes taxa considered taxonomically invalid.

Information for each of the endangered, threatened, Category 2, and sensitive species is presented in the following paragraphs. Since Category 3b and 3c species are either taxonomically invalid or less subject to identifiable threats than previously thought, additional discussion is not presented here.

Endangered Species

The following summary of the whales was provided by the NMFS (letter September 11, 1987) and ADF&G (letter February 6, 1987).

Humpback whales (*Megaptera novaeangliae*). Humpback whales are the most abundant endangered whales that occur in Southeast Alaskan waters. Their populations in the North Pacific are about 1,200, which is about 8 percent of pre-whaling numbers. During the summer feeding season, these whales range widely from the subarctic boundary (about 40 degrees North Latitude) north into the Chukchi Sea. The greatest population densities are reached in certain inshore waters, where the animals appear to be largely resident during the summer and autumn. Baker, et al. (1985) estimates that 300-350 humpback whales inhabit Southeast Alaska during the summer and fall. The main foods of humpback whales in Southeastern Alaska are euphausiaceans (*Euphausia pacifica*), herring (*Clupea harengus*), and capelin (*Mallotus villosus*). Because the humpback inhabits shallow coastal areas, it is increasingly exposed to human activity. Consequently, these whales may be more susceptible to confrontational disturbance, displacement, and loss of habitat from environmental degradation than some other whale species. Humpbacks summering in Southeast Alaska have been linked to each of the three wintering areas in Mexico, Hawaii, and Asia.

Gray whales (*Eschrichtius robustus*). Gray whales are endemic to the north Pacific. The eastern Pacific population now numbers about 16,000 animals, about the same as existed prior to commercial whaling; whereas the western Pacific population is apparently on the verge of extinction. The eastern population spends the summer in the northern Bering and Chukchi Seas, and migrates along the coast to winter grounds on the west coast of Baja California, where the calves are born. Twice each year virtually the entire eastern Pacific population of gray whales passes along the outer coast, mostly within five kilometers of the beach. The northward migration of animals, by Southeast Alaska, without calves, takes place from March to early May, with a peak in early April. Cows with calves migrate later. The southward migration takes place during November and December. Gray whales do not feed while migrating along the California coast, but possible surface-feeding behavior has been reported during spring migration at Cape St. Elias. On the summer grounds gray whales feed primarily on benthic gammaridean amphipods. The NMFS is currently considering delisting the eastern Pacific population of the gray whale (minutes of Interagency Wildlife Technical Committee Meeting of 20 March 1991).

Sei (*Balaenoptera borealis*) **and sperm whales** (*Physeter macrocephalus*). Sei and sperm whales generally move in and out of the offshore areas seasonally. The population of the sperm whale is still considered to be at harvestable levels by the International Whaling Commission with a world population exceeding 980,000 and an eastern North Pacific population of 274,000, 80 percent of pre-exploitation levels. The NMFS is currently considering delisting the sperm whale (minutes of Interagency Wildlife Technical Committee Meeting of 20 March 1991). Estimates of the North Pacific population of the sei whale range from 22,000 to 37,000 animals, 65 percent of pre-exploitation levels. Whaling of this stock ceased after 1975 when sei whales were protected.

Bowhead whale (*Baleana mysticetus*). At about 25 percent of its pre-exploitation levels, the bowhead whale population is in excess of 4,000 animals and is increasing. There is a low and closely regulated harvest of bowheads. The bowhead whale has not been reported in the Gulf of Alaska.

Fin whale (*Balaenoptera physalus*). The North Pacific fin whale population is between 15,000 and 19,000 animals, about 40 percent of historic levels. Fin whales will generally move in and out of the offshore areas seasonally and are infrequently taken by Alaska Natives.

Blue whale (*Balaenoptera musculus*). The North Pacific population of blue whales is 1,600, less than one-third of historic levels. Although only occasionally found in coastal waters, blue whales are observed in the Aleutian Islands and enter the Chukchi Sea through passes in the Aleutian Chain. Survey information is limited, but there is no evidence that North Pacific stocks are recovering despite their complete protection for twenty years.

Right Whale (*Balaena glacialis*). Known to occur in the Gulf of Alaska, eastern Aleutian Islands, and southcentral Bering Sea, the North Pacific population of the right whale may be as low as 100 animals. They were formerly found near Kodiak Island and off the Alaska panhandle. Because of their low numbers, their use of coastal waters, and apparent low reproductive rate, right whales may be the most vulnerable of all whales to habitat incursion and deterioration.

American Peregrine Falcon (*Falco peregrinus anatum*). The American peregrine falcon is primarily associated with interior Alaska for breeding, nesting and rearing of young; it is highly migratory, wintering as far south as northern Argentina (Ambrose, etal, 1988). It occurs in Southeast Alaska only during migration periods. Population numbers in Alaska are continuing to increase (ADF&G letter dated Feb. 6, 1987; Ambrose, et al., 1988). The USFWS is preparing a Federal Register notice to consider delisting the American peregrine falcon; reproduction is increasing and populations are up three-fold (minutes of Interagency Wildlife Technical Committee Meeting of March 20, 1991).

Threatened Species

Arctic peregrine falcon (*Falco peregrinus tundrius*). The Arctic peregrine falcon is primarily associated with area north of the Brooks Range and Seward Peninsula; it is highly migratory, wintering as far south as northern Argentina (Ambrose, et al.,, 1988). It occurs in Southeast Alaska only during migration periods. Population numbers in Alaska are continuing to increase (ADF&G letter dated Feb. 6, 1987; Ambrose, et al.,, 1988). The USFWS is preparing a Federal Register notice to consider delisting the Arctic peregrine falcon; reproduction is increasing and populations are up three-fold (minutes of Interagency Wildlife Technical Committee Meeting of March 20, 1991).

Steller (Northern) sea lion (*Eumetopias jubata*). On April 5, 1990, the northern sea lion was given an emergency listing as a federally threatened species (50 CFR 227, Fed. Reg. Vol. 55, No. 66, April 5, 1990). A final decision listing the northern sea lion as a federally threatened species was made by the NMFS on November 26, 1990, and appeared in the December 4, 1990 Federal Register. The Federal Register established specific restrictions on human activities for all major rookeries west of the Kenai Peninsula. A recovery team is tentatively recommending no human disturbance within 1,000 feet of haulouts and 3,000 feet of all rookeries; at this time there is no recommendation for airborne restrictions (minutes of Interagency Wildlife Technical Committee Meeting of March 20, 1991).

Candidate Species

Glacier Bay water shrew (*Sorex alaskanus*). The Glacier Bay water shrew has only been documented to exist in one locality: Point Gustavus, Alaska. To our knowledge, there are only two sources of literature documenting its existence: 1) Proceeding of the Washington Academy of Science (2):18, March 14, 1900; 2) Journal of Mammalogy (7):58, February 15, 1926. These two sources are cited in The Mammals of North America by Hall and Kelson, 1959. Hall and Kelson suggest that it may be a sub-species of *Sorex palustris*.

Other than the documentation that the species exists at Point Gustavus, no other information is available; nothing is known about its distribution, population status, or habitat requirements.

North American lynx (*Felix lynx canadensis*). The North American Lynx is found in very low numbers only on the mainland in Southeast Alaska. It is legally harvested during the

trapping seasons. The snowshoe hare (*Lepus americanus*), its principal prey species, is restricted to the mainland and is found primarily on the glacial flats and river valleys. Hare populations never reach the high densities attained at cyclic peaks in the interior (Meehan, 1974), and this may be a principal factor for the very low numbers of lynx. There is current debate over whether trapping of the species in Southeast Alaska should continue to be allowed.

Marbled murrelet (*Brachyramphus marmoratum*). The marbled murrelet is a robin-sized seabird that belongs to the family Alcidae. It is found throughout the North Pacific, with two subspecies being recognized: the Asiatic subspecies ranges from Kamchatka south to Japan; the North American subspecies ranges from the Aleutian Islands, Kodiak Island and Kenai Peninsula of Alaska south to central California, with individuals wintering as far south as southern California (Marshall, 1988, Interagency Meeting Records June 12, 1989).

The species feeds below the water's surface on small fish and invertebrates (Marshall, 1988). They are usually found within a couple miles of shore, rarely found more than four miles from shore (Interagency Meeting Records, June 12, 1989).

They nest on land and lay only one egg. Unlike most other species in the family Alcidae, they do not nest in colonies, although at some sites they may nest in small aggregations. Seven ground nests have been found for the Siberian sub-species, one nest in a rocky crevice (Marshall, 1988; Interagency Meeting Records, June 12, 1989). Up until 1974, no nests had been found for the North American sub-species. On August 7, 1974, the first nest was found in a California State Park. Located right above a campsite in a campground, this nest was 10 miles inland from the Pacific Ocean, 140 feet high in an old-growth Douglas-fir tree on a 45 cm wide limb. In 1984 during a marbled murrelet research project conducted by the Alaska Department of Fish and Game, a tree nest was found on Baranof Island. This nest was on a large horizontal limb, 82 feet up in a mountain hemlock tree. Tree nests have been documented in the Soviet Union; one of the nests was in the top of a broken snag (Marshall, 1988; Interagency Meeting Records, June 12, 1989). In 1989, two more tree nests were found in California. Both nests were in large Douglas-fir trees, on large horizontal limbs. Both nests were watched 24 hours a day. A newly hatched bird at one of these nests was carried off by a raven (Interagency Meeting Records, June 12, 1989).

It is reported that Bob Armstrong found a marbled murrelet egg along the Treadwell Trail on Douglas Island during July 1989. Arlene Doyle found a bird sitting on the ground five miles inland in a stand of trees at Yakutat. In both cases, no nests were found.

Both males and females incubate marbled murrelet eggs. One bird stays at the nest for 24 hours, while the other is feeding on the ocean. After hatching their young, the adults only stay at the nest with the young bird for about four days. After that, the young bird is left alone in the nest, except when the adults return to the nest to feed it (Interagency Meeting Records June 12, 1989).

Except for the fall period when they are molting, flightless, and stay on the ocean, birds have been known to fly to tree stands during every month of the year. In California, birds have been found 25 miles inland (Interagency Meeting Records, June 12, 1989).

The U. S. Fish and Wildlife Service hosted a marbled murrelet workshop in Juneau, Alaska in April 1991. The following are a few notes from the workshop summarizing the current inventory and research related to upland habitat use by marbled murrelets:

Overview of upland surveys in Oregon. Surveys included three age classes of timber stands (old growth, mature, young). Marbled murrelets were associated with mature and old-growth stands. Younger stands from fire origin with remnant old growth trees were used. Marbled

murrelets used all forest types (Douglas fir, mixed conifer, etc.). They were more abundant in stands closer to the ocean. They had 76 occupied sites; marbled murrelets were using stands ranging in size from 23 acres to 2,000 acres, with the mean stand size of 482 acres. There was a correlation with the number of bird detections and stand size (larger stands=more detections). There are no alpine areas along the coast range of Oregon, therefore no opportunity for alpine nesting. Two nest sites were located, both in large mature to old growth trees. A great horned owl ate young at one of the nest sites.

Overview of upland work in Washington. Researchers selected an entire drainage to survey for murrelets. The drainage was classified into four cover types: clearcut, poles, mature-old growth, rock-talus. Marbled murrelets more abundant in mature-old growth types. Two nest sites were located; they were 26 miles inland and were 150 feet apart from each other. In landscapes with over 30 percent old growth, there were higher detection rates for marbled murrelets. However, some landscapes with more than 30 percent old growth did not have marbled murrelets, indicating a clumped distribution for the marbled murrelets. They did not find preference for stands closer to the coast as in the Oregon study. The farthest inland detection for marbled murrelets was 49.5 miles.

Overview of upland work in California. Birds would fly into upland stands every month of the year, but peak use was during the May to August period. Stands 500 + acres in size had highest detections of marbled murrelets, but the study was not set up to test for the effects of stand size. The kind of old growth was not important - marbled murrelets used all types. Older second-growth stands were not used, but the stands did not have remnant old-growth trees in them as in Oregon.

Overview of upland work in Alaska. There is a newly-started upland study of marbled murrelets on Naked Island in Prince William Sound. A murrelet nest was found at the base of alder in an alpine area; however, it is not known if the nest was a marbled murrelet nest or a Kittlitz's murrelet nest. This study is just beginning. The Forest Service will be doing the vegetation typing and mapping for the project.

Current marbled murrelet research efforts are aimed at developing techniques for detecting birds as they fly into stands, locating nests, and identifying tree and stand habitat requirements. Evidence to date suggests that birds are using old-growth and not young second-growth stands. Due to the scarcity of older second-growth stands anywhere in their range, information on their use of older second growth is lacking (Interagency Meeting Records, June 12, 1989).

A cooperative pilot study/survey between U.S. Forest Service and U.S. Fish and Wildlife Service is planned to begin in summer, 1991, to evaluate possible at-sea survey techniques. Data from this study will be used to develop a statistically valid sampling design for a region-wide inventory to ascertain abundance and distribution of marbled murrelets in Southeast Alaska.

Marbled murrelets may be a species which shows a habitat/use relationship with the size of its preferred habitats. Some preliminary data from current research efforts show the highest number of bird detections are in old-growth patches over 500 acres in size, fewer detections are in old-growth patches 100-500 acres in size; no detections have been recorded in old-growth patches less than 100 acres in size. However, it is emphasized that this is only preliminary data analysis. Some of the larger patches of old growth are nearer the ocean, and this could be a factor influencing the number of bird detections rather than the result of old-growth patch size. Marbled murrelets are also social in nature, so larger blocks would naturally be expected to have more birds, and therefore, a higher detection rate, than smaller patches with fewer birds (Interagency Meeting Records, June 12, 1989).

Old growth is not the only factor which may be influencing populations; other known factors include oil spills, predation, and commercial fishing (murrelets are caught in fishing nets). Current population estimates are shown in Table 3-107.

Table 3-107
Current population estimates for marbled murrelet

	Marshall, 1988	Interagency Mtg Records 1989	Ineragency Mtg. Records 1991
California	<1,000 pairs	2,000 birds	2,000-10,000 birds
Oregon	<2,400 pairs	2,500 birds	——
Washington	1,900-3,500 prs.	10,000 birds	——
Alaska	>100,000 birds	>250,000 birds	——
British Columbia	unknown	unknown	20,000-40,000

Plants

Knowledge of plant species' distribution and abundance in Southeast Alaska is increasing. Since the publishing of plant species in the September 27, 1985 Federal Register, a cooperatively funded review of plant species was conducted for the State of Alaska resulting in recommendations to change the status of several plant species listed in the September 27, 1985 Federal Register (Murray and Lipkin, 1987). Agencies cooperating in the review included the U. S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, U. S. Forest Service, University of Alaska Museum - Fairbanks). In the February 21, 1990 Federal Register, several changes were made in the status of plants. The following summarizes information on the Category 2 plant species listed in the February 21, 1990 Federal Register. This information is from: 1) *Rare Vascular Plant Species of the U. S. Forest Service Alaska Region - Including Sensitive Species Recommendations*, a report by the Alaska Natural Heritage Program/The Nature Conservancy, 1991; 2) a letter dated April 18, 1991 from the Alaska Natural Heritage Program.

Aster yukonensis. This plant has not been documented to occur on the Tongass National Forest, but could possibly occur. The Alaska Natural Heritage Program provides the following ranking for this species on the basis of its global and state rareness: the species is given a "G1Q" rating which means that it is critically imperiled globally but it is taxonomically questionable; the state ranking is "S1" which means it is critically imperiled in the state because of extreme rarity or because of some factors (factors are not identified) making it especially vulnerable to extirpation from the state.

Calamagrostis crassiglumis. This plant has not been documented to occur on the Tongass National Forest, but as more thorough botanical inventories proceed, there is a good chance it will be found. The plant is only known to occur in Alaska at one site in the Aleutians and on Kodiak Island. It occurs more widely on the Queen Charlotte Islands south to the state of Washington, with a disjunct population in California. The species is found to occur in coastal swamps and brackish meadows. While no collections are known from Southeast Alaska, the widespread nature of this habitat type makes it likely that the species will be found here. The Alaska Natural Heritage Program provides the following ranking for this species on the basis of its global and state rareness: the species is given a "G3" rating which means that it is either very rare and local throughout its range or found locally in a restricted range; the state ranking is "S3" which means it is rare or uncommon in the state.

Carex lenticularis var. dolia. This plant is associated with wet meadows, lake shores, and snowbeds, generally at higher elevations (above 600 meters in Southeast Alaska). The species ranges from the coastal mountains of Alaska and British Columbia, and in the Rocky Mountains from Jasper, B.C., south to Glacier National Park, Montana. However, few collections of *var. dolia* are known; *var. dolia* has been documented at four sites on or adjacent to the Tongass National Forest. The Alaska Natural Heritage Program provides the following ranking for this species on the basis of its global and state rareness: the species is given a "G5" rating which means that it is demonstrably secure globally; however, var. dolia is given a "T2" rating which means that it is imperiled globally; the state ranking is "S1" which means it is critically imperiled in the state because of extreme rarity or because of some factors (factors are not identified) making it especially vulnerable to extirpation from the state.

Montia bostockii. This plant is documented from the North Slope of Alaska and the interior of eastern Alaska and adjacent Yukon Territory. It is also known from the eastern Wrangells, where it is found in habitats which also occur in the Tongass (moist-wet alpine meadows). It is a distinct endemic of Alaska and the Yukon and is known from only 5-6 sites in the United States. Since the alpine flora of the Tongass is poorly known, it is quite possible that the plant will be found on the Tongass as further botanical inventory is done. The Alaska Natural Heritage Program provides the following ranking for this species on the basis of its global and state rareness: the species is given a "G3" rating which means that it is either very rare and local throughout its range or found locally in a restricted range; the state ranking is "S3" which means it is rare or uncommon in the state.

Sensitive Species

Three birds and three fish on the Tongass National Forest have been designated as sensitive species by the Regional Forester: osprey (*Pandion haliaetus*), Peale's peregrine falcon (*Falco peregrinus pealei*), trumpeter swan (*Cygnus buccinator*), northern pike (*Esox lucius*), Fish Creek chum salmon (*Oncorhynchus keta*), King Salmon River and Wheeler Creek populations of king salmon (*Oncorhynchus tshawytscha*).

Osprey. Four nesting pairs of osprey and eight nest sites have been documented in Southeast Alaska, all located in the Stikine Area (Hughes, undated). Nest locations include Thomas Bay, Wrangell Narrows near Finger Point, and near the mouth of McCormick Creek on Wrangell Island. Ospreys have been observed at Towers Arm, Irish Lakes, and Kah Sheets on Kupreanof Island. Nest trees include broken-top spruce (live or dead) and western hemlock snags. All nest trees were located in the hemlock/spruce forest type and near streams or coastal beaches. Ospreys nest from late April through August and probably overwinter in Mexico and Central America. Historically, there is no evidence that there were more osprey in Southeast Alaska. The population numbers have remained stable but low. Limiting factors are unknown, but available nest sites and foraging areas do not appear to be limiting. The interagency task group did not recommend an intensive program for increasing the osprey population because we do not understand the reasons why they have never been more abundant in Southeast Alaska.

Peale's Peregrine Falcon. Thirty-six nests of Peale's peregrine falcon have been located in Southeast Alaska; 32 of which are on the Tongass National Forest. Nest surveys are very difficult to conduct, and biologists believe many more nests may be present. Peregrine nest distribution is closely associated with large sea bird colonies located on the outer coasts or nearby islands. The nest sites are on cliffs from 20 to 275 meters in height and all but one face the open ocean. Seabirds are thought to be major prey of the falcon. Information on falcon breeding biology or reproductive success is limited, but based on U.S. Fish and Wildlife Service surveys, populations do appear to be stable.

Trumpeter Swans. Nineteen pairs of trumpeter swans occur on the Forest at Yakutat; an additional 13 nesting pairs are in the Chilkat Valley on non-National Forest lands. Surveys by the U.S. Fish and Wildlife Service indicate the Yakutat population has been stable, while the population in the Chilkat Valley has increased from 1 pair in 1975 to the current 13 pairs. Trumpeter swans winter in ice-free areas throughout Southeast Alaska; information on wintering habitats and populations is very limited. Numerous swans from other parts of Alaska migrate through Southeast Alaska, and many may be wintering in suitable habitats in Southeast.

Northern Pike. Northern pike are found in five lakes, referred to as Pike Lakes, about 23 miles east of Yakutat (Browning, 1986). These lakes are shallow, with high concentrations of humic acid and peat-filled margins. The northern pike in Pike Lakes are the only natural-occurring pike in Southeast Alaska and are probably remnant populations that survived only because the most recent glacial advance missed the Pike Lakes area. Relatively little information is available on the life history and population dynamics for these pike populations.

Large Chum Salmon. Near Hyder on the Portland Canal, Fish Creek produces very large chum salmon, probably the largest chum salmon in North America. Several fish over 38 pounds have been weighed by biologists. Fish weighing 25 pounds are common. The average size is close to 20 pounds compared to 10 pounds for the average chum stock. A high percentage of the returning fish have spent 4 and 5 years in the ocean, accounting for large average size (S. Zemke, personal communication, U.S. Forest Service). Fish Creek is a low gradient stream, dominated by high quality spawning gravels and extensive areas of groundwater upwelling. The predominant upwelling and high quality spawning gravels appear to be the reasons for the remarkable production levels. The population appears to be stable.

The U.S. Forest Service, in cooperation with the Alaska Department of Fish and Game, has undertaken a program of chum habitat improvement. The Marx Creek chum spawning channels have been constructed, adding over a mile of new spawning habitat for these fish. Fish Creek gravels have also been cleaned of sediments deposited from the floods of 1960's. In cooperation with the recreation staff on Misty Fiords National Monument and the Hyder Community Association, an interpretive display has been constructed to tell the story of the Fish/Marx Creek chum.

The chum habitat improvement projects have also been monitored extensively, and a coded wire tag program has been implemented to evaluate the number of chum fry leaving the Fish/Marx Creek system, numbers intercepted by the commercial fishers, and numbers returning to the watershed, to better understand how the Fish Creek chum can be managed for the benefit of all user groups.

Island Run King Salmon. King Salmon River and Wheeler Creek populations of king salmon are island genetic stocks. No other naturally-occurring runs of island king salmon stocks are known to exist in Southeast Alaska (S. Kessler, personal communication, U.S Forest Service, 1990). King Salmon River and Wheeler Creek are both within Kootznoowoo Wilderness. Information on these populations is limited. The King Salmon River stock serves as an important king salmon transplant source for other streams and rivers.

Species Currently Being Considered for Sensitive Status

The Forest Service initiated a Challenge Cost Share Agreement with The Nature Conservancy to review information on the distribution and abundance of plants in the Alaska Region. As a result of this agreement, The Nature Conservancy provided the Forest Service with a report dated January 1, 1991, titled: *Rare Vascular Plant Species of the U. S. Forest Service Alaska Region - Including Sensitive Species Recommendations.*

In addition, the Forest Service is participating in The Nature Conservancy's Natural Heritage Data Base. Information from this data base is available to participating State and Federal agencies and provides immediate access to the most recent information on species distribution and abundance.

The Forest Service also participates in an interagency wildlife technical committee which, as part of its charter, reviews species for sensitive status consideration. Agencies making up the wildlife technical committee include: the Forest Service; Alaska Department of Fish and Game; and U. S. Fish and Wildlife Service. As a result of the technical committee's work, a number of species are currently being considered for sensitive status. These are listed in Table 3-108.

Table 3-108

Species currently being considered for sensitive status

Plant Species	Vertebrate Species
Poa merrilliana	Northern Goshawk (*Accipiter gentilis laingi*)
Poa norbergii	
Arnica lessingii ssp. norbergii	
Castilleja chrymactis	
Rhinanthus arcticus	
Atriplex drymarioides	
Carex lenticularis var. dolia	
Dodecatheon pulchellum ssp. alaskanum	
Draba borealis var. maxima	
Platanthera chorisiana	
Platanthera gracilis	
Puccinellia hultenii	
Puccinellia kamischatica	
Ranunculus orthorhynchus var. alaschensis	
Romanzoffia unalaschcensis	
Senecio moresbiensis	
Stellaria ruscifolia ssp. aleutica	
Cirsium edule	
Glyceria leptostachya	
Hymenophyllum wrightii	
Ligusticum calderi	
Poa laxiflora	
Taxus brevifolia	

Sources: Alaska Natural Heritage Program/The Nature Conservancy, 1991, Rare Vascular Plant Species of the U. S. Forest Service Alaska Region - Including Sensitive Species Recommendations; ADF&G letter of March 9, 1990; Wildlife Technical Committee Meeting of 20 March 1991.

The Forest Service is cooperating in administrative studies and inventories to obtain additional information on the distribution, abundance, and habitat requirements for these species. The Regional Forester has not designated these species as sensitive species at this time.

Methodology and Scientific Accuracy

Threatened and Endangered and Candidate species of plants and animals are determined by the USFWS and NMFS. No recovery plans have been developed and no critical habitats have been identified for any of the threatened and endangered species in Southeast Alaska (development of recovery plans and designation of critical habitats are the responsibility of the USFWS and NMFS).

Information on threatened, endangered and candidate species was obtained from published literature, workshops, species experts, and local biologists. Biological assessments were prepared by Forest Service Biologists. These biological assessments were presented to the USFWS and NMFS for their review and opinion as required by Section 7 of the Endangered Species Act, as amended.

Sensitive species were identified following National Forest Service Guidelines for sensitive species (FSM 2670) and Region 10 guidelines (USFS Region 10, January 1990).

The Affected Environment section of Chapter 3 summarizes the habitat and population information for each of the Threatened, Endangered, Sensitive and Category 2 Candidate species. The following lists some of the uncertainties and data gaps associated with the species.

Whales. Most of the information and data for whales in Southeast Alaska is associated with one species, the humpback whale, because it is the most abundant whale to occur in Southeast Alaskan marine habitats. The other seven species of whales are present either only seasonally as they migrate along the outer coastal areas, or are only occasionally found in the inside marine waters of Southeast Alaska. More research is needed to understand the importance of Southeast Alaska marine habitats for the populations of the other seven species of whales.

Steller Sea Lion. Information on population trends in Southeast Alaska is sketchy. Research into year-around habitat requirements is needed.

American and Arctic Peregrine Falcons. These species occur in Southeast Alaska only during migration periods. Their length of stay and the habitats they utilize in Southeast Alaska is unknown.

Plants. Information on candidate and potential sensitive plant species in Southeast Alaska is very limited. Currently, the Region is cooperating in a Challenge Cost Share Agreement with The Nature Conservancy to review information on the distribution and abundance of plants in the Alaska Region. In addition, the Region is participating in The Nature Conservancy's Natural Heritage Data Base. This data base provides participating state and federal agencies with the most recent information on species distribution and abundance. The data base also provides a global ranking system categorizing species according to worldwide distribution and abundance. On January 1, 1991, the Alaska Natural Heritage Program provided the Region with a report on "Rare Vascular Plant Species of the U. S. Forest Service Alaska Region - Including Sensitive Species Recommendations." Surveys to document the distribution and abundance of the plant species identified in this report, and documentation of the types of habitats required by these plants are needed.

Sensitive Species

Osprey. Only four nesting pairs of osprey have been documented in Southeast Alaska. The factors limiting osprey populations are not known.

Peale's Peregrine Falcon. Information on breeding biology and reproductive success is limited. Not all suitable habitat areas have been surveyed; biologists believe many more pairs may be present in Southeast Alaska. Year around habitat information is needed.

Trumpeter Swan. Information on wintering habitats and populations is very limited. Factors limiting the distribution and number of nesting pairs need to be researched.

Northern Pike. Relatively little information is available on the life history and population dynamics for the pike populations on the Tongass.

Large Chum Salmon. The Forest Service and ADF&G are cooperating in habitat and population monitoring for the large chum salmon. This monitoring has been implemented to evaluate the number of chum fry leaving the watershed, the numbers of fish intercepted by commercial fisheries, and numbers returning to the watershed, to better understand how the Fish Creek chum can be managed for the benefit of all user groups.

Island King Salmon. Information on these populations is limited. A monitoring program similar to the large chum salmon program would provide important information.

Glacier Bay Water Shrew. This shrew has only been documented to exist in one locality: Point Gustavus, Alaska. There are only two sources of literature documenting its existence. Its taxonomic validity has been questioned. Its distribution and abundance is unknown.

North American Lynx. Knowledge of its distribution and abundance in Southeast Alaska is limited to trapping records.

Marbled Murrelet. There are many unknowns pertaining to the habitat needs of this species. Some of them are: We do not know if the birds use the same tree and limb year after year. There is no data on how many birds or pairs will nest in an area. There is no data on use of older second-growth stands. With one egg per pair, there is need to understand population dynamics for the species. Here in Alaska where there is still a large amount of old growth, the species is not evenly distributed in relation to the old growth - so we need to understand all of the factors affecting its distribution. Old-growth forests are not the only factor affecting the populations; other known factors include oil spills, predation, and commercial fishing (murrelets are caught in fishing nets).

Island Biogeography. Only some of the ecological relationships of the island archipeligo of the Tongass National Forest have been evaluated to date. There are many opportunities for research and inventory to better understand the habitat and dispersal relationships of species throughout the Forest.

Threatened, Endangered, Candidate and Sensitive Species

Environmental Consequences

Direct, Indirect and Cumulative Effects

This section focuses on the effects alternatives will have on habitats and/or populations of threatened, endangered, candidate, and sensitive species. Initial consultation procedures and other requirements of the Endangered Species Act, as amended, have been completed, and an update with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) is in progress. Both USFWS and NMFS provided "no effect" determinations, subject to following the Forest-wide Standards and Guidelines and will provide further consultation during site-specific projects.

Whales

Since the eight species of endangered whales are totally associated with the marine environment, the primary focus was to evaluate how National Forest management activities affect the marine environment. These management activities are the development and use of log transfer facilities (LTF's) and their associated camps, the movement of log rafts from log transfer facilities to mills, and the potential development of other docks and associated facilities for mining, recreation, and other forest uses and activities. Generally, with the development and use of LTF's and other docking facilities for projects, there is an associated increase in recreational boating in the immediate vicinity during the construction and use of the facilities.

Because it is the most abundant whale to occur in Southeast Alaskan waters, most of the information and data for whales in Southeast Alaska is associated with one species, the humpback whale. The other seven species of whales are either only present seasonally as they migrate along the outer coastal areas, or are only occasionally found in the inside coastal waters of Southeast Alaska. The following discussion and analysis is primarily based on humpback whales, but is assumed to be applicable to the other species of whales as well.

Direct and Indirect Effects

Construction and operation of LTF's and other docking facilities are restricted to small, very localized areas of the marine environment. There are 116 LTF's currently on the Tongass National Forest. There is an estimated 227 acres of marine benthic disturbance associated with these existing LTF's. Not all of the LTF's are active at the same time. An estimated 98 to 176 new LTF's may be needed in the future depending on the amount and distribution of future timber harvesting. An estimated 192 to 345 acres of marine disturbance would be associated with these new LTF's. During the Summer 1989, there was a report of a humpback whale entangled in some cables from an inactive LTF site on the Stikine Area. To our knowledge, this is the only direct effect incident related to LTF's.

Two potential indirect effects of LTF's and other docking facilities and associated activities have been identified: 1) effects on whale prey species; and 2) disturbances of whales by boat traffic associated with LTF's.

Effects on prey. Nemoto (1970) noted that euphausiids and gregarious fish are the primary prey of humpbacks. Thirteen species of fish and 57 species of invertebrates were identified as humpback whale prey in Southeast Alaska. Humpbacks studied in Glacier Bay and Stephens Passage-Frederick Sound were found most frequently in areas of high prey density (Wing and Krieger, 1983).

Construction and operation of all LTF's and similar facilities require U.S. Army Corps of Engineer and U.S. Environmental Protection Agency permits, and State of Alaska Tidelands

permits. The permitting process provides that construction and operation maintain water quality in the specific facility locations, and that marine circulation and flushing are maintained. All facilities must be in conformance with permit standards. No impacts to the marine environment which would affect whale prey species are anticipated.

Effects from disturbance. Humpback whale response to nearby boating activity varies from no apparent response to pod dispersal, sounding, breaching, evasive underwater maneuvers, and maintaining distance (Baker and Herman 1983; Baker et. al., 1982). Disturbance by boat activity has been suggested as one of the possible causes of observed changes in whale distribution in Southeast Alaska. Direct pursuit of whales by boats, and frequent changes in boat speed and direction appear to elicit avoidance behaviors more frequently than other types of boat traffic. However, whales may readily habituate to constant and familiar noise (Norris and Reeves, 1978). Whales can be commonly found in some areas of Southeast Alaska which have considerable boat traffic; however, there is no known documentation of whether or not they are habituated to boat traffic.

Two basic types of boat activity would be associated with LTF's: log raft towing and recreational boating by workers. Log raft towing frequencies would vary between camps, seasons, and years; a general average may be about one a week during the operating season (U.S. Forest Service, 1989-94 Operating Period for the Ketchikan Pulp Company Long-term Sale Area). Tugs would maintain relatively constant speeds (about 1-2 knots per hour) and directions during raft towing. Constant speed and direction elicit less avoidance behavior from whales than other types of boating activity. Log raft towing routes are generally well-established, and adverse effects from log raft towing have not been documented.

Recreational boating activity would vary between seasons, years, and camps of different sizes. This activity would be concentrated near LTF sites, other docking facilities and camps. It is estimated that most recreational boating would occur within a few miles of the site, few trips would be made over 10 miles, and activity greater than 30 miles from a site would be negligible. This boating may involve frequent changes in speed and direction and may include some small amount of whale pursuit, if the whales are within sight of the camp or an occupied boat. The effect of such recreational activity on whales would depend on many factors such as size and depth of the bay; number of boats; and individual whale behavior responses, etc. At the present time, there is no quantifiable way to estimate these possible effects.

The following standards and guidelines have been developed for application on all Forest Service permitted or approved activities:

Provide for the protection and maintenance of whale habitats.

1. Avoid intentional aircraft flights below 500 feet above-ground-level in the known vicinity of whales on Forest Service permitted or approved activities, when weather ceilings permit.
2. Avoid intentional approach in a vessel of 100 feet or more in length to within 1/4 mile of whales on Forest Service permitted or approved activities, when safe passage exists.
3. Avoid intentional approach in a vessel of less than 100 feet in length to within 100 yards of whales on Forest Service permitted or approved activities, when safe passage exists. (See Chapter 4, Proposed Revised Forest Plan.)

No direct effects on whales from implementation of Forest management activities are anticipated. Indirect effects may be associated with possible increased disturbance of whales; however, the above standards and guidelines should prevent indirect effects related to Forest Service permitted or approved activities.

Relationship with other Agencies and Plans

The National Marine Fisheries Service has responsibility for threatened and endangered species of whales. At present, a draft recovery plan for the humpback whale is in progress. No other recovery plans are in process for other whales which may frequent Southeast Alaska. No critical habitat has been designated for whales in Southeast Alaska.

The amount of human activity in the marine environment associated with Forest management activities is only a fraction of the total amount of human activity occurring in the marine environment. Some of the other activities include: commercial fishing, sport fishing, hunting, subsistence, tourism and mariculture. Many of these activities are not regulated by the Forest Service. The National Marine Fisheries Service is currently proposing regulations for how close humans may approach marine mammals. The purpose of these regulations is to reduce disturbance to marine mammals from activities such as whale pursuing. Such regulations would reduce the indirect disturbance effects discussed above.

Formal and informal consultation procedures (as directed by the Endangered Species Act, as amended in 50 CFR 17.7, and Forest Service Manual 2670) are used with the National Marine Fisheries Service on all projects within areas used by whales. Forest-wide Standards and Guidelines (see Chapter 4, Proposed Revised Foret Plan) for threatened and endangered species direct that all projects will comply with requirements of the Endangered Species Act and Forest Service Policy (FSM 2670).

The State of Alaska has an Endangered Species Law which authorizes the Commissioner of the Alaska Department of Fish and Game to list Alaska endangered species. The Commissioner has listed the humpback whale, blue whale, and black right whale as endangered species in Alaska (February 6, 1987 letter). Forest Service policy (FSM 2670) directs that formal and informal consultation procedures for all threatened and endangered species include the State of Alaska.

Steller Sea Lion

Direct and Indirect Effects

The NMFS provided a summary of factors affecting the Steller sea lion (Federal Register Vol. 55, No. 66, 50 CFR Part 227). These factors include: reductions in the availability of food resources - especially pollock which is the most important prey species for sea lions; commercial harvests of sea lion pups; subsistence harvests of sea lions; harvests for public display and scientific research purposes; predation by sharks, killer whales and brown bear; disease; the inadequacy of existing regulatory mechanisms such as quotas on the incidental harvesting of sea lions during commercial fishing operations; other natural or humanmade factors such as incidences of fishermen shooting adult sea lions at rookeries, haul out sites, and in the water near boats. None of these factors are regulated or within the jurisdiction of the Forest Service.

Southeast Alaska populations have not declined to the extent that other populations have. Harassment or displacement of sea lions from preferred habitats by human activities such as boating, recreation, aircraft, log transfer facilities, log raft towing, etc., is a concern with regard to long-term conservation of the sea lion in Southeast Alaska. Forest-wide standards and guidelines direct the Forest Service to prevent and/or reduce potential harassment of sea lions and other marine mammals on activities carried out by or under the jurisdiction of the Forest Service. The Forest-wide Standards and Guidelines (see Chapter 4, Proposed Revised Forest Plan) for marine mammal habitats are:

A. Provide for the protection and maintenance of harbor seal, Steller sea lion and sea otter habitats.

1. Ensue that Forest Service permitted or approved activities are conducted in a manner consistent with the Marine Mammal Protection Act and the Endangered Species Act. "Taking" of marine mammals is prohibited; taking includes harassment, pursuit, or attempting any such activity.

2. Locate facilities and concentrated human activities requiring Forest Service approval as far from known marine mammal haul outs, rookeries and known concentration areas as practicable. The following distances are provided as general guidelines for maintaining habitats and reducing human disturbance:

   - Facilities, camps, LTF's, campgrounds and other developments should be located 1 mile from known haul outs, and farther if the development is large.
   - For aircraft flights on Forest Service approved projects, when weather ceilings permit, maintain a constant flight direction and airspeed and a minimum flight elevation of 1000 feet (305 meters) within .5 miles (800 meters) of the haul outs, when weather ceilings permit.
   - For boat traffic on Forest Service approved projects, remain at least .5 miles (800 meters) away from hauled-out harbor seals during the pupping and rearing season (15 May - 1 July). Minimize disturbance of seals with pups in the water by remaining at least 330 feet (100 meters) away from parturient seals. (Note: These distances are derived from a study in a park where hunting is prohibited and access is restricted and where viewing seals is encouraged. These distances may be too liberal and may need to be enlarged in situations where access and hunting are not controlled and where seals would be expected to be more reactive to boat traffic.)
   - Minimize disturbance effects of boat traffic: for molting harbor seals, remain .5 miles (800 meters) away from haul outs where seals are molting; for Stellar sea lions, remain at least .5 miles (800 meters) away from haul outs and rookeries; for sea otters, avoid known feeding and resting concentration areas, especially following prolonged stormy periods when sea otters have been unable to feed.
   - Individuals associated with Forest Service permitted or approved activities will not intentionally approach within 100 yards, or otherwise intentionally disturb or displace any hauled-out marine mammal.

3. Cooperate with State and other Federal agencies to develop sites and opportunities for the safe viewing and observation of marine mammals by the public. Maintain a public education program explaining Forest management activities related to marine mammals in cooperation with State and other Federal agencies.

No direct effects on sea lions from Forest management activities are anticipated. The Forest-wide Standards and Guidelines are designed to prevent indirect effects of harassment or displacement due to Forest Service management activities.

Relationship with other agencies and plans. The National Marine Fisheries Service is establishing a Recovery Team to provide recommendations on further conservation measures. Members of the North Pacific Fishery Management Council, the Marine Mammal Commission, state agencies, and other prominent scientists and environmentalists will be invited to participate in developing and implementing a recovery program. The Pacific States Marine Fisheries Commission, in emergency consultation with interested parties, held a workshop on February 21-22, 1991, to identify and assess additional possible action that might be undertaken on an emergency basis.

The National Marine Fisheries Service is currently proposing regulations for how close humans can approach marine mammals. Such regulations would reduce indirect disturbance effects.

Formal and informal consultation procedures (as directed by the Endangered Species Act, as amended and 50 CFR 17.7) are used by the Forest Service with the National Marine Fisheries Service on all projects within areas used by sea lions. Forest-wide standards and guidelines for threatened and endangered species direct all projects to follow the requirements of the Endangered Species Act and Forest Service Policy (FSM 2670).

Peregrine Falcons

Direct and Indirect Effects

The American and arctic peregrine falcons occur in Southeast Alaska only during migration. The primary reason for past declines in peregrine falcon populations was the proliferation of organochlorine pesticides, especially DDT and its principle metabolite DDE (Ratcliff, 1969; Peskall, 1976; Cade, et al., 1971; Peskall and Kiff, 1979; U.S. Fish and Wildlife Service, 1982). No organochlorine pesticides are authorized for use on the Tongass National Forest.

During migration through Southeast Alaska, the availability and abundance of prey species will most likely be the primary habitat factor affecting peregrine falcons. In coastal areas of Washington, the primary prey species for peregrine falcons were shorebirds and waterfowl species; passerine birds were also identified in the diet (Anderson and Debruyn, 1979; Anderson, et al., 1980). It is assumed that food sources would be similar for coastal Alaska.

Peregrines forage over open sites such as over bodies of water, marshes, grasslands, shorelines, and over wooded areas. Peregrines attack flying prey from above or by chasing them. Although they forage over wide areas, they also have preferred foraging sites (White, 1974).

Actual migration routes and patterns, and foraging areas have not been identified for these two subspecies of peregrines in Southeast Alaska. The following Forest-wide standards and guidelines (see Chapter 4, Proposed Revised Forest Plan) have been developed for protecting seabird rookeries and waterfowl concentration areas:

Seabird Rookeries.

A. Provide for the protection and maintenance of seabird (marine bird) rookeries.

1. Locate facilities and concentrated human activities requiring Forest Service approval as far from known seabird colonies as practicable. The following distances are provided as general guidelines for maintaining habitats and reducing human disturbance:
    - For aircraft flights on Forest Service permitted or approved activities, when weather ceilings permit, maintain a constant flight direction and airspeed and a minimum flight elevation of 1,500 feet (458 meters) for helicopters and 500 feet (153 meters) for fixed-winged aircraft. If at all possible, avoid flying over seabird colonies.
2. Minimize the availability of garbage to gulls by requiring special use permittees to collect and dispose of garbage from their special use authorizations.
3. Cooperate with State and other Federal agencies to develop sites and opportunities for the safe viewing and observation of these species by the public. Maintain a public education program explaining Forest management activities related to these species in cooperation with State and other Federal agencies.

Waterfowl Habitats.

A. Maintain or enhance wetland habitats which receive high use by waterfowl species such as ducks, geese and shorebirds.

1. Identify during project environmental analysis, in cooperation with the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service, any wetlands which receive high use by waterfowl.
2. Locate facilities and concentrated human activities requiring Forest Service approval as far from known waterfowl concentration areas as practicable. Minimize disturbance of geese and waterfowl by restricting, when practical, development activities to periods when geese and waterfowl are absent from the area.
3. Maintain habitat capability in coastal wetlands and intertidal areas that are important migratory staging areas and fall/winter/spring concentration areas, and wetlands that are important nesting and brood-rearing habitats, by avoiding where practical, all development activities which could fill wetlands, drain wetlands, or alter water levels resulting in loss of desirable vegetation, or direct loss of habitat.
4. Avoid, where possible, management activities within 410 feet (125 meters) of geese habitat when geese are present during nesting, brood rearing, molting and wintering periods.
5. Minimize human disturbance of habitats and protect wetland vegetation during critical periods of the year (nesting and brood-rearing, molting, and winter) by regulating human use (such as aircraft, hiking, boating, off-highway vehicle use) in important wetland areas. The following distance limits are provided as general guidelines for reducing possible human effects:
   - For aircraft flights on Forest Service approved projects, when weather ceilings permit: 1,500 feet (458 meters) above ground level for helicopters; 500 feet (153 meters) above ground level for fixed-wing aircraft; 1 mile (1.6 km) horizontal distance and 1,000 feet (305 meters) above ground level for helicopters from molting sea ducks; 1,000 feet (305 meters) above ground level for fixed-wing aircraft over habitat used by molting geese.
   - Provide a minimum distance of 410 feet (125 meters) between human activities on the ground and areas being used by geese and other waterfowl.
6. When human use results in significant adverse effects on waterfowl habitat, regulate such use to eliminate or reduce the adverse effects.
7. Regulate off-highway vehicle use to prevent degradation of habitat or adverse disturbance of populations.
8. Develop waterfowl habitat improvement projects in cooperation with appropriate State and Federal agencies.
9. Protect and maintain the soil and water quality and quantity from disturbances of waste discharge and fill material and other soil disturbances that lead to concentrations of surface water and soil erosion, which may lead to rill or gully erosion and subsequent water quality degradation.
10. For Special Use Administration (non-recreational), issue only authorizations which meet the objectives of Executive Order 11990 (Protection of Wetlands). Issue permits which serve to preserve, enhance, or aid in the management of the natural and beneficial values of wetlands.

11. Perform integrated logging system and transportation analysis to determine if other practical routes avoiding these high use waterfowl areas exist.
12. If the need to restrict road access is identified during project interdisciplinary review, roads will be closed either seasonally or year-round to minimize adverse effects on waterfowl.
13. Cooperate with State and other Federal agencies to develop sites and opportunities for the safe viewing and observation of these species by the public. Maintain a public education program explaining Forest management activities related to these species in cooperation with State and other Federal agencies.

A wide variety of passerine (perching and song) birds will be available from a wide variety of open and forested communities. Adverse effects on American and Arctic peregrine falcon populations or their habitats are not anticipated with any Forest management activities. Population numbers of both the American and Arctic peregrine falcon populations are continuing to increase (ADF&G letter dated February 6, 1987; Ambrose, et al., 1988). The Forest Service was recently informed by the USFWS that a Federal Register notice is being prepared to consider delisting both the American and Arctic peregrine falcons; reproduction and populations are increasing (minutes of Interagency Wildlife Technical Committee Meeting, March 20, 1991).

Relationship with other Agencies and Plans

The U.S. Fish and Wildlife Service has responsibility for the threatened and endangered species of peregrine falcons. Recovery Plans have been developed for the Pacific States peregrine falcon population but do not include Alaska (U.S. Fish and Wildlife Service, 1982). No critical habitats have been designated in Southeast Alaska.

Formal and informal consultation procedures (as directed by the Endangered Species Act, as amended and 50 CFR 17.7, and Forest Service Manual 2670) are used with the U.S. Fish and Wildlife Service on all projects within areas thought to be used by these two subspecies of peregrine falcons. Forest-wide standards and guidelines (see Chapter 4, Proposed Revised Forest Plan) for threatened and endangered species direct all projects to follow requirements of the Endangered Species Act and Forest Service Policy (FSM 2670).

The State of Alaska has an Endangered Species Law which authorizes the Commissioner of the Alaska Department of Fish and Game to list Alaska endangered species. The Commissioner has listed the American and Arctic peregrine falcons as endangered species (February 6, 1987 letter). Forest Service policy (FSM 2670) directs formal and informal consultation procedures for all threatened and endangered species with the State of Alaska.

Candidate Plants

Direct and Indirect Effects

Of the eight species of candidate plants, one is currently listed as Category 3c (*Thlaspi arcticum*), and three are currently listed as Category 3b (*Poa merrilliana, Poa norbergii, Rhinanthus arcticus*). *Thlaspi arcticum* is known to occur in only one location in Southeast Alaska. This location is allocated to Land Use Designations which maintain roadless and undeveloped characteristics. No adverse effects on this plant specie are anticipated with Forest management activities. Since the three species listed as Category 3b are considered taxonomically invalid, further evaluation and analysis is meaningless until their taxonomic status is determined.

Evaluations of the four plants listed as Category 2 species follows.

Aster yukonensis. This plant has not been documented to occur on the Tongass National Forest; it has been found along the south end of Kluane Lake (Yukon Territory, Canada) and also on the south slope of the Brooks Range. Habitats where it has been collected include a river bank, a dry streambed, and in the dry silt, sand, and gravel of a river delta (J. Delapp, Alaska Natural Heritage Program/The Nature Conservancy, personal communication). It is more of an interior, dry site species, but could conceivably exist in one of the drier interior sites of the Tongass. Forest-wide standards and guidelines for riparian and wetlands (see Chapter 4, Proposed Revised Forest Plan) are expected to maintain habitats in which this species may be found. Also, application of the following three Land Use Designations (LUD's) are expected to maintain favorable habitat conditions for this species: the Beach Fringe and Estuary LUD, Stream and Lake Protection LUD, and Fish Habitat and Water Quality Requirements LUD.

Calamagrostis crassiglumis. This plant has not been documented to occur on the Tongass National Forest, but as more thorough botanical inventories proceed, there is a good chance it will be found. The plant is only known to occur in Alaska at one site in the Aleutians and on Kodiak Island. It occurs more widely on the Queen Charlotte Islands south to the state of Washington, with a disjunct population in California. The species is found to occur in coastal swamps and brackish meadows. While no collections are known from Southeast Alaska, the widespread nature of this habitat type makes it likely that the species will be found here. Forest-wide standards and guidelines for riparian, wetlands and waterfowl habitats (see Chapter 4, Proposed Revised Forest Plan) are expected to maintain habitats in which this species may be found. Also, application of the following three Land Use Designations (LUD's) are expected to maintain favorable habitat conditions for this species: the Beach Fringe and Estuary LUD, Stream and Lake Protection LUD, and Fish Habitat and Water Quality Requirements LUD.

Carex lenticularis var. dolia. This plant is associated with wet meadows, lake shores, and snowbeds, generally at higher elevations (above 600 meters in Southeast Alaska). The species ranges from the coastal mountains of Alaska and British Columbia, and in the Rocky Mountains from Jasper, B.C., south to Glacier National Park, Montana. However, few collections of *var. dolia* are known; *var. dolia* has been documented at four sites on or adjacent to the Tongass National Forest. Forest-wide standards and guidelines for riparian, wetlands and waterfowl habitats are expected to maintain habitats in which this species may be found. Also, application of the following two Land Use Designations (LUD's) are expected to maitain favorable habitat conditions for this species: Stream and Lake Protection LUD, and Fish Habitat and Water Quality Requirements LUD.

Montia bostockii. This plant is documented from the North Slope of Alaska and the interior of eastern Alaska and adjacent Yukon Territory. It is also known from the eastern Wrangells, where it is found in habitats which also occur in the Tongass (moist-wet alpine meadows). It is a distinct endemic of Alaska and the Yukon and is known to occur on only 5-6 sites in the United States. Since the alpine flora of the Tongass is poorly known, it is quite possible that the plant will be found on the Tongass as further botanical inventory is done. About the only activity occurring in the type of habitat where this specie occurs is dispersed recreation. Some localized minerals management activities could occur. We expect that the type of habitat where this species occurs is secure for the forseeable future.

Obtaining more information on these plant species, as well as other plant species has been identified as an information need for the Forest.

Relationship with other Agencies and Plans.

A cooperatively funded review of plant species was conducted for the State of Alaska (Murray and Lipkin, 1987). Agencies cooperating in the review included the U. S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, and U. S. Forest Service, University of Alaska Museum, Fairbanks. Results of this review have been previously discussed.

Fall 1989, Region 10 of the Forest Service implemented a sensitive plant species challenge cost-share agreement with the Alaska Natural Heritage Program/The Nature Conservancy. Under this partnership agreement, the Alaska Natural Heritage Program conducted an exhaustive inventory to identify plant species for consideration for sensitive species designation by the Regional Forester. A report was recently issued by the Alaska Natural Heritage Program titled *Rare Vascular Plant Species of the U. S. Forest Service Alaska Region - Including Sensitive Species Recommendations.*

Candidate Animals

Glacier Bay Water Shrew

Direct and indirect effects. The Glacier Bay water shrew has only been documented to exist in one locality: Point Gustavus, Alaska. To our knowledge, there are only two sources of literature documenting its existence: 1) "Proceedings of the Washington Academy of Science" (2):18, March 14, 1900; 2) "Journal of Mammalogy" (7):58, February 15, 1926. These two sources are cited in *The Mammals of North America* by Hall and Kelson, 1959. Hall and Kelson suggest that it may be a sub-species of *Sorex palustris.*

Other than the documentation that the Glacier Bay water shrew exists at Point Gustavus, Alaska, no other information is available; nothing is known about its distribution, population status, or specific habitat requirements. If the Glacier Bay water shrew is similar to other water shrews, it will be associated primarily with riparian habitats. Point Gustavus is part of Glacier Bay National Park. Point Gustavus is also adjacent to private land. The nearest National Forest land is Pleasant Island to the south and the Excursion Inlet area to the east. Pleasant Island is a designated Wilderness Area, which will maintain the natural plant communities and natural ecological processes in riparian areas. The Excursion Inlet Area is allocated to a combination of Natural Setting and Moderate Development Land Use Designations (LUD's); in riparian areas, the Stream and Lake Protection LUD or the Fish Habitat and Water Quality LUD will apply. Application of these prescriptions will provide a variety of habitat conditions ranging from old-growth forest conditions to early successional stages, depending on channel types. This range in habitat conditions is expected to provide for the habitats needed by the Glacier Bay water shrew if it exists on National Forest lands. Obtaining additional information on this species has been identified as an information need for the Forest.

Relationship with other agencies and plans. The U. S. Fish and Wildlife Service periodically conducts "Notice of Reviews" for candidate species. Other federal and state agencies can provide information as part of the Notice of Review.

The Forest Service has initiated a Challenge Cost Share Agreement with The Nature Conservancy to review information on the distribution and abundance of vertebrate species in the Alaska Region. This work is currently in progress.

North American Lynx

Direct and indirect effects. Lynx are found in very low numbers only on the mainland in Southeast Alaska. The snowshoe hare (*Lepus americanus*), its principal prey species, is restricted to the mainland and is found primarily on the glacial flats and river valleys. Hare

populations never reach the high densities attained at cyclic peaks in the interior (Meehan, 1974), and this may be a principal factor for the very low numbers of lynx. Timber harvesting and other forest management activities are not likely to greatly influence prey populations to the degree that lynx populations would be affected, either positively or negatively. Lynx have been legally harvested during the trapping seasons; trapping seasons may have had the greatest human influence on lynx populations in Southeast Alaska.

Relationship with other agencies and plans. The U. S. Fish and Wildlife Service periodically conducts "Notice of Reviews" for candidate species. Other federal and state agencies can provide information as part of the Notice of Review.

The Forest Service participates in the Interagency Furbearer Working Group which includes the Alaska Department of Fish and Game, Bureau of Land Management, Fish and Wildlife Service, and National Park Service.

Trapping seasons prior to 1990 have been under the regulation of the State of Alaska. However, in 1990, subsistence trapping seasons are under the regulation of Federal agencies on Federal lands, and non-subsistence trapping seasons are under the regulation of the State of Alaska.

Marbled Murrelet

Direct and indirect effects. Research is currently underway along the west coast to identify the nesting habitat needs of the marbled murrelet. An overview of existing knowledge was provided in the affected environment section. Briefly, nesting habitat has been primarily associated with mature to old-growth forest stands. Younger stands from fire origin with remnant old-growth trees have also been used. Studies have indicated that marbled murrelets will use all forest types (i.e., Douglas-fir, mixed conifer, mountain hemlock, etc.). Marbled murrelets have been documented using forest stands ranging in size from 23 acres to 2,000 acres. A newly started upland study on Naked Island in Prince William Sound located a murrelet nest at the base of alder in an alpine area; however, it is not known if the nest was a marbled murrelet nest or a Kittlitz's murrelet nest. Several studies have documented murrelets using forest stands up to 25 or 26 miles inland. The farthest inland detection to date for marbled murrelets is 49.5 miles.

Since all inland forest stands on the Tongass are much less than 25 miles from salt water, all could be potential nesting habitat. Table 3-109 displays the distribution of old growth forests on the Tongass within 21 ecological provinces. Using a maximum potential effects analysis that all old-growth forest stands classified as tentatively suitable would be harvested (this does not occur in any of the alternatives considered for the Forest Plan Revision), 58 percent of the productive old growth would be remaining Forest-wide; it would be distributed among the 21 provinces ranging from 13,495 to 559,871 acres of productive old growth in each of the 21 provinces. In addition, there are from 2,604 to 460,297 acres of unproductive old growth within each province.

The U.S. Fish and Wildlife Service, June 1991, issued a Proposed Rule in the Federal Register to list the marbled murrelet as Threatened in Oregon, Washington, and northern California, but not in Alaska.

Table 3-109

Existing conifer old growth in 21 Ecological Provinces

	Ecological Province	Total Productive Old Growth Acres	Unproductive Old Growth Acres	Old Growth Tentatively Suitable Acres
1	Yakutat Forelands[1]	49,137	35,927	23,585
2	Yakutat Uplands[1]	24,737	7,933	744
3	East Chichagof Island	408,484	153,960	193,157
4	West Chichagof Island	69,472	101,472	6,838
5	East Baranof Island	95,287	72,257	49,575
6	West Baranof Island	216,342	193,818	89,871
7	Admiralty Island	586,793	219,190	26,922
8	Lynn Canal	152,917	100,875	81,718
9	Northern Coast Range	321,945	135,170	163,703
10	Kupreanof/Mitkof	313,446	278,810	176,862
11	Kuiu Island	297,322	91,402	148,514
12	Central Coast Range	242,047	159,276	93,197
13	Etolin Island and Vicinity	228,123	187,590	133,827
14	North Central POW	547,590	414,436	412,913
15	Revilla/Cleveland	523,700	460,297	290,756
16	Southern Outer Islands	115,962	70,764	44,543
17	Dall Island and Vicinity	64,953	29,898	51,458
18	South POW Island	167,833	2,604	99,876
19	North Misty	198,205	244,428	20,107
20	South Misty	311,665	326,556	0
21	Ice Fields[1]	114,802	143,241	25,573

Source: Revision data base, Q200E , April 1991; QW1016_PROV, May 1991.

[1] These acres represent the oldest tree stands in these provinces; however, they may not contain all of the characteristics associated with old-growth stands in the other provinces.

In areas with timber harvesting, the amount of nesting habitat for murrelets will be reduced. However, the amount of old growth currently being used by marbled murrelets is unknown, and factors currently limiting marbled murrelets in Southeast Alaska have not been identified. The total relationship between old-growth habitat available for nesting and marbled murrelet populations is unknown at this time. Obtaining more information on this species has been identified as an information need for the Forest.

Relationship with other agencies and plans. The U. S. Fish and Wildlife Service periodically conducts "Notice of Reviews" for candidate species. Other federal and state agencies can provide information as part of the Notice of Review. The U. S. Fish and Wildlife Service is currently reviewing the status of the marbled murrelet for possible listing as threatened or endangered under authority of the Endangered Species Act (this likely will not include Alaska).

Research is currently in progress along the west coast to obtain more information on the marbled murrelet. Several federal and state agencies are cooperating in this research.

Old growth is not the only factor which may be influencing populations; other known factors include oil spills, predation, and commercial fishing. In British Columbia, a local salmon fishery is estimated to have netted six percent of the breeding marbled murrelets (Council on Environmental Quality, 1988).

Prince of Wales Flying Squirrel

Direct and indirect effects. In a June 5, 1987, memorandum, the U.S. Fish and Wildlife Service recommended changing the Prince of Wales flying squirrel from a Category 2 candidate species to a Category 3c candidate species. In making this recommendation, the U.S. Fish and Wildlife Service provided the following information on the Prince of Wales flying squirrel:

> The squirrel is known to be largely dependent on old-growth forest for both nesting and foraging habitat. Current estimates of old growth harvesting on Prince of Wales Island indicate that enough old growth will remain for populations of flying squirrels. Noble and Harrington (1978) examined the density of snags in the mature forest on [Prince of Wales] Island and found that snags were present at densities up to 60 per acre — far in excess of flying squirrel habitat requirements. The squirrel is also apparently coexisting in healthy numbers with introduced marten on the island.

An Interagency Task Group evaluated the habitat requirements for flying squirrels and determined that habitat necessary to maintain viable populations would be available on Prince of Wales Island (ref.: Interagency Task Group meeting records, July 18, Sept. 1 and 8, 1988).

Prince of Wales Island is within two ecological provinces: North Central Prince of Wales (#14) and Southern Prince of Wales (#18). Table 3-110 displays the amount of old growth within these provinces in designated Wilderness and Legislated LUD II areas. Reported densities of flying squirrels range from 2 to 5 per hectare (.8 to 2 per acre). The Wilderness Areas and Legislated LUD II Areas on Prince of Wales Island are estimated to provide habitat capability ranging from 83,000 to 208,000 squirrels (low range based on .8 squirrels per acre for all productive old growth; high range based on 2 squirrels per acre for all productive old growth).

Table 3-110

Old Growth Acres within Wilderness and Legislated LUD II Areas in Ecological Provinces 14 and 18 on Prince of Wales Island.

Province	Wilderness/LUD II	Productive Old Growth Acres	Unproductive Old Growth Acres
14	Salmon Bay	4,474	4,519
	Mt. Calder/Holbrook	33,503	15,438
	Karta River	21,195	11,396
18	Nutkwa	12,821	5,061
	South Prince of Wales	32,154	47,038
Total Acres		**104,147**	**83,452**

Source: Revision Database, Q200ELUD, May 1991.

In addition to the Wilderness Areas and Legislated LUD II Areas, the riparian areas will be managed according to either the Stream and Lake Protection prescription or the Fish and Water Quality prescription. There will also be both productive and unproductive old growth in various patch sizes between these areas. The following Forest-wide snag/cavity nesting Standards and Guidelines will maintain important habitat components for flying squirrels as well as other cavity-nesting species:

A. Provide habitat for cavity-nesting wildlife species. Use the following chart as a guide for evaluating the relationship between the number of snags present in an area and the percent of maximum woodpecker populations which can be supported:

Number of Snags* Required per 100 Forested Acres to Support Various Percentagees of Maximum Woodpecker Populations in Southeastern Alaska**

	Percent of Maximum Populations									
Species	**100%**	**90%**	**80%**	**70%**	**60%**	**50%**	**40%**	**30%**	**20%**	**10%**
Red-breasted Sapsucker	160	144	128	112	96	80	64	48	32	16
Hairy Woodpecker	672	605	538	470	403	336	269	202	134	67

Source: Habitat Capability Models - Appendix B
*Soft and hard snags which are greater than15 inches DBH and greater than 10 feet in height
**Forested acres refers to all lands capable of supporting 10 percent tree cover

1. During project planning, evaluate snag/cavity habitat on an entire 4th order watershed basis. Averaged on a fourth order watershed basis, a minimum of 275 snags per 100 forested acres will be maintained. Analyze red-breasted sapsucker and hairy woodpecker habitat capability using habitat capability models.

2. Retain snags within all land use designations allowing timber harvest. Consider the following:
   - Retain soft and hard snags where possible, while meeting management objectives, considering safety needs for people and equipment.
   - Where possible, save both hard and soft snags in areas protected from wind.
   - Snags do not need to be evenly distributed; clumped distributions are preferred.
   - Favor saving snags away from roads to reduce loss from firewood gathering activity.
   - After timber harvest in an area, remaining snags may be designated as wildlife trees and marked to make them illegal for cutting.
   - Consider retaining live trees for future snag recruitment.

The following Biodiversity/Old Growth standards and guidelines (see Chapter 4, Proposed Revised Forest Plan) will also help maintain large old-growth stands for the longest period of time, and will provide second-growth stands of suitable size when they reach an age and condition suitable for flying squirrel habitat:

6. For old-growth habitats, in allocations allowing timber harvest, maintain large old-growth blocks and corridors between old-growth blocks where compatible with other resource objectives.

   1. Concentrate timber harvesting activities to provide for unroaded and unlogged old-growth forests in areas adjacent to the timber harvesting. Three techniques are suggested:

- Harvest timber in vertical, wide continuous strips. Harvest areas should be considered from riparian areas to tree line, with adjacent old-growth forests also extending from riparian areas to tree line. The size of area to be harvested should be large enough to provide for logical future timber harvest units.
- To retain important lowland old-growth habitats during most of the first timber rotation, strive to harvest upper portions of a watershed first. This approach will maximize the availability, at any point in time, of the remaining lowland old-growth forest. Emphasize timber harvesting on northerly aspects prior to southerly aspects. Where possible, southerly aspects should be maintained as contiguous units of old-growth habitat types.
- Use large and continuous harvest areas, wherein the harvest of old-growth should proceed from the periphery inward. This is called the "locust method" which leaves at any point in time the largest contiguous block of old-growth within any cutting unit. This also minimizes the amount of edge habitat vulnerable to windthrow.
- Facilitate dispersal of wildlife species between old-growth forest blocks. Use unharvested forested beach and estuary fringes and riparian areas, and, if necessary, designate additional biological corridors to facilitate dispersal of wildlife species.

Relationship with other agencies and plans. The U. S. Fish and Wildlife Service periodically conducts "Notice of Reviews" for candidate species. Other federal and state agencies can provide information as part of the Notice of Review. At the present time, no other known research activity is occurring on the Prince of Wales flying squirrel.

Suemez Island Ermine

Direct and indirect effects. In a June 5, 1987, memorandum, the U.S. Fish and Wildlife Service recommended changing the Suemez Island ermine from a Category 2 candidate species to a Category 3c candidate species. In making this recommendation, the U.S. Fish and Wildlife Service provided the following information on the Suemez Island ermine: "Ermine are known to utilize a variety of habitats and are not dependent on old-growth forest, since their chief prey items include voles, other small rodents, small birds, fish and insects, prey availability may temporarily increase following logging practices."

An Interagency Task Group evaluated the habitat requirements for ermine and determined that habitat necessary to maintain viable populations would be available on Suemez Island (ref.: Interagency Task Group meeting records, July 18, Sept. 1 and 8, 1988).

Relationship with other agencies and plans. The U. S. Fish and Wildlife Service periodically conducts "Notice of Reviews" for candidate species. Other federal and state agencies can provide information as part of the Notice of Review. At the present time, we are not aware of any research being done by other agencies on the Suemez Island ermine.

Glacier Bear

Direct and indirect effects. The glacier bear is a color phase of the black bear. At the present time, this color phase of the black bear appears to be secure within the black bear population. Analysis of black bear population viability is presented in Section III of this report.

Relationship with Other Agencies and Plans. The U. S. Fish and Wildlife Service periodically conducts "Notice of Reviews" for candidate species. Other federal and state agencies can provide information as part of the Notice of Review.

Black bear hunting seasons prior to 1990 have been under the regulation of the State of Alaska. However, in 1990, subsistence hunting seasons are under the regulation of Federal agencies on Federal lands, and non-subsistence hunting seasons are under the regulation of the State of Alaska.

Sensitive Species

Osprey

Direct and indirect effects. Limiting factors for osprey populations are unknown, but availability of nest sites and foraging areas do not appear to be limiting. The following standards and guidelines (see Chapter 4, Proposed Revised Forest Plan) have been developed to provide for protection of nest sites as they are identified:

A. Maintain and enhance osprey populations and habitat.

1. Establish and maintain a minimum 330-foot (100-meter) radius (horizontal distance) habitat management zone around each existing osprey nest tree. Determine the exact boundary based on local topography, timber type, windfirmness, and other factors.
2. Within the osprey nest zones, prohibit all land use activity which would likely disturb the osprey. Infringement may be acceptable depending on the nature of the project and timing of the activity.
3. Maintain the osprey nest zone even though the nest or nest tree becomes inactive.
4. Provide trees suitable for use by osprey for nesting, feeding and perching. Consider the following:
   - Snags and live trees that dominate or co-dominate a shoreline.
   - Snags with broken tops and live trees with large enough branches to support birds.
5. Regulate Forest Service sponsored activities within .5 miles (800 meters) of osprey nests to prevent disturbance during the nesting season (April 15 - September 1).
6. New nests will receive the same level of management protection as existing nests, however, osprey which select new nests in close proximity to existing human activities will not require those activities to be terminated.
7. Annually exchange records with appropriate State and Federal agencies on the status of populations and habitat. Ideally, population and nest surveys (checks on known nests) should be done annually; however, surveys will be done at least once every 5 years.

Additional knowledge gained through research and monitoring will be needed to develop an increased data base for managing osprey habitat.

Peale's Peregrine Falcon

Direct and indirect effects. The U.S. Fish and Wildlife Service maintains a data base with confidential locations of all known nest sites of Peale's peregrine falcon in Southeast Alaska. The following standards and guidelines (see Chapter 4, Proposed Revised Forest Plan) have been developed to provide for protection of Peale's peregrine falcon habitat:

A. Provide for the protection and maintenance of peregrine falcon habitat.

1. Maintain nest site location data in cooperation with the U.S. Fish and Wildlife Service.
2. Exchange records with appropriate State and Federal agencies annually on the status of populations and habitat.
3. Plan project activities to avoid adverse impacts to the falcons and habitats. Evaluate proposed projects within 2 miles (3.2 km) of known falcon nests, for their effects

considering such items as: a) human activities (aircraft, ground and water transportation, high noise levels, and permanent facilities) which could cause disturbance to nesting pairs and young during the nesting period April 15 - August 31; b) activities or habitat alterations which could adversely affect prey availability. Coordinate all project activities with the U.S. Fish and Wildlife Service.

4. Within 15 miles (24 km) of all known nest sites, prohibit all use of herbicides and pesticides which cause egg shell thinning or other problems in birds of prey.

Standards and guidelines for sea bird and waterfowl (listed previously) will also maintain foraging habitat for this species. No organochlorine pesticides (which cause egg shell thinning) are authorized for use on the Tongass National Forest. Implementation of the standards and guidelines is expected to prevent any adverse effects on Peale's peregrine falcon populations and habitats.

Trumpeter Swans

Direct and indirect effects. At the present time, the only documented nesting habitat for trumpeter swans on the Forest is at Yakutat, in the Yakutat Forelands Ecological Province (#1). About 96 percent of this province is within legislated LUD II areas or other natural setting Land Use Designations. All of the nesting habitat would be classified as wetlands and/or riparian habitat. Standards and guidelines for wetlands and riparian would apply to these areas. In addition, the Stream and Lake Protection LUD or the Fish Habitat and Water Quality Monitoring LUD (see Chapter 3, Proposed Revised Forest Plan) would apply. The following standards and guidelines (see Chapter 4, Proposed Revised Forest Plan) have been developed for trumpeter swan habitats on the Forest:

A. Provide for the protection and maintenance of Trumpeter Swan habitats.

1. Avoid disturbance of trumpeter swans, particularly during nesting, brood-rearing and wintering periods, to prevent abandonment of nests, brood-rearing areas, and winter habitats. As a general guideline, minimize disturbance by providing a minimum separation of .5 miles (800 meters) between waterbodies used by nesting, brood-rearing and wintering trumpeter swans and human activities or developments. The District Ranger will, after consultation with appropriate resource specialists, take all practical measures to minimize disturbance.
2. Avoid placement of overhead wires, fences, or other structures which could interfere with the flight paths of swans and cause injury or mortality.
3. Cooperate with State and other Federal agencies to develop sites and opportunities for the safe viewing and observation of this species by the public. Maintain a public education program explaining Forest management activities related to this species in cooperation with State and other Federal agencies.
4. In cooperation with State and Federal agencies, evaluate levels of lead in habitat areas, and evaluate effects on trumpeter swan populations.

Factors that limit trumpeter swan populations are unknown. Nesting, brood rearing and wintering habitats for trumpeter swans are associated with streams, rivers, lakes and ponds. Standards and guidelines have been developed to provide for their habitat. As such, all areas will also be managed with standards and guidelines for the Stream and Lake Protection or Fish and Water Quality prescriptions, unless the areas are allocated to more restrictive management prescriptions. Additional research and monitoring are needed to identify the factors which may currently be limiting to swan populations. Implementation of the standards and guidelines, coupled with additional research and monitoring, is expected to provide a positive effect on trumpeter swan populations and habitats.

Northern Pike

Direct and indirect effects. Northern Pike are found in five lakes on the Yakutat Forelands. Standards and guidelines for wetlands and riparian apply to these areas. Also, the prescriptions for Stream and Lake Protection or Fish and Water Quality apply. In addition, the following specific standards and guidelines (see Chapter 3, Proposed Revised Forest Plan) for northern pike apply:

A. Provide for the protection and maintenance of northern pike found in the Pike Lakes on the Yakutat Forelands. This population of northern pike is unique to Southeast Alaska.

1. Avoid the placement of facilities (Forest Service and non-Forest Service) in the vicinity of the Pike Lakes which would increase harvest pressure to the point where the viability of these species is affected.
2. Coordinate with the Alaska Department of Fish and Game on any activities which would affect the viability of the northern pike.
3. Coordinate with other groups or Federal and State agencies to develop and fund a program of study to understand the life history and genetic characteristics of this unique population of northern pike.

Road access exists within 1/2 mile of the lakes. There is no land suitable for timber harvest immediately around the lakes. Natural habitat conditions associated with the lakes is expected to be maintained. Fishing regulations will play an important part in ensuring that no overharvesting of these pike populations occurs.

Large Chum Salmon

Direct and indirect effects. The habitat for the large chum salmon in Fish Creek, near Hyder on the Portland Canal, will be managed in accordance to standards and guidelines for Wetlands, Riparian, and the LUD's of Stream and Lake Protection or Fish and Water Quality (see Chapters 3 and 4, Proposed Revised Forest Plan) . In addition, the following standards and guidelines for Chum Salmon apply:

A. Provide for the protection and maintenance of chum salmon in Fish Creek near Hyder. This population of chum salmon is characterized by their extraordinary large size.

1. Coordinate with the Alaska Department of Fish and Game and the National Marine Fisheries Service on commercial, sport and subsistence fish use, hatchery egg take programs, and other activities affecting the viability of the chum salmon runs in Fish Creek in order to preserve these populations.
2. Coordinate with the Alaska Department of Fish and Game and the National Marine Fisheries Service on any activities which would affect the viability of the chum salmon.
3. Coordinate with other groups or Federal and State agencies to develop and fund a program of study to understand the life history and genetic characteristics of this run of chum salmon.
4. Provide for habitat improvement and maintenance to maintain the viability of this run of salmon, as necessary.

Improvement projects have been initiated to increase their spawning habitat. With these improvement projects, the habitat for these chum salmon is expected to be improved in the future. These fish stocks are also used for commercial, sport and subsistence fishing. Fishing regulations will play an important part in ensuring that overharvesting of these populations of large chum salmon does not occur.

Island Run King Salmon

Direct and indirect effects. King Salmon River and Wheeler Creek habitats for Island Run king salmon are both within Admiralty Island National Monument Wilderness. Natural habitat conditions are to be maintained. The following standards and guidelines apply (see Chapter 4, Proposed Revised Forest Plan) :

A. Provide for the protection and maintenance of runs of king salmon that naturally occur on islands. The runs in King Salmon and Wheeler Creeks on Admiralty Island are the only known naturally-occurring island king salmon populations. Both streams are located within Kootznoowoo Wilderness.

1. Coordinate with the Alaska Department of Fish and Game and National Marine Fisheries Service on commercial, sport and subsistence fish use, hatchery egg take programs, and other activities affecting the viability of king salmon runs in order to preserve these unique populations.
2. Avoid the placement of facilities (Forest Service and non-Forest Service) in the vicinity of these streams which would increase harvest pressure on these king salmon runs.
3. Coordinate with other groups or Federal and State agencies to develop and fund a program of study to understand the life history and genetic characteristics of these unique runs of king salmon.

These stocks, whose eggs are transplanted into other streams and rivers, are also used for commercial, sport and subsistence fishing. Fishing regulations will play an important part in ensuring that overharvesting of Island Run king salmon populations does not occur.

Additional Direction

The following general Forest-wide Standards and Guidelines (see Chapter 4, Proposed Revised Forest Plan) apply to all threatened, endangered and sensitive species:

I. Threatened and Endangered Species

A. Meet the requirements of the Endangered Species Act, as amended.

1. Utilize informal and formal consultation procedures, and conference procedures (whichever is appropriate) with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service for all major construction activities and other forest management activities which may have an affect on federally-listed threatened, endangered, or proposed species population or critical habitat.
2. Maintain and/or improve habitats for the recovery and conservation of federally-listed threatened, endangered and proposed species. Implement National and Regional Forest Service policy and direction for management of threatened, endangered, and proposed species. (Consult FSM 2670.)
3. Support monitoring, research, and inventory work for threatened, endangered, proposed and candidate species. Coordinate with appropriate Federal and State agencies. Use "challenge cost share" agreements, "Section 6 Grants" (under authority of the Endangered Species Act), and other partnerships.

II. Sensitive Species

A. Implement national and regional Forest Service policy and direction for the identification and management of sensitive species. (Consult FSM 2670.)

1. When population or habitat declines for a plant or animal species become a Forest Service concern, evaluate the particular species for approval/placement on the Regional Sensitive Species List by the Regional Forester.

2. Provide for viable populations of sensitive species by maintaining existing habitat capabilities within known use areas. Where desirable, implement habitat improvement projects to increase habitat capabilities and expand species distributions.
3. The status of sensitive species shall be reviewed at least every 5 years. Such status reviews shall recommend whether or not a species should continue to be listed as a sensitive species.
4. Identify research needs for sensitive plants and animals on the Forest.

Timber

Affected Environment

Changes Since the DEIS

As a result of the passage of the Tongass Timber Reform Act (TTRA), there are several changes in the timber section since release of the DEIS . Several provisions of the act affected the timber base in the 1979 Forest Plan and also affected the administration of the Long-term Sale Program. Specifically, six new wilderness areas were designated, twelve other areas were given a permanent "Land Use Designation II" status, and stream buffers of at least 100 feet on either side of all "Class I" streams and "Class II" streams that flow directly into Class I streams are required. Many of these areas contain land which was also in the 1979 Plan's timber base; commercial timber production and harvest will no longer be allowed within these areas. The act also made nine unilateral contract modifications to the long-term contracts (discussed under "Long-term Timber Sales Program" below).

Background

Timber production can be defined as the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use (36 CFR 219.3). Timber is only one of several valuable resources in Southeast Alaska and many people depend on it for their livelihood. Wood has become the basis for a major industry that provided about 2,203 jobs of direct employment and 1,879 jobs of indirect or induced employment during Fiscal Year 1990 (TSPIRS, 1990). Forest products from the area are marketed throughout the world. Alaskan producers exported $2,941.3 million in pulp products, logs, and lumber to countries in Asia, Europe, Canada, and Latin America during Fiscal Years 1981 through 1989. Forest product exports were the second largest exporting sector from Alaska in Fiscal Year 1989, representing 24.8 percent of total export earnings (ANILCA Section 706(a), Report No. 9).

This section describes the timber component of the area that would affect and that would be affected by the alternatives if implemented. The timber component is described in terms of the Timber Resource, Silvicultural Practices, Timber Supply, Tongass Timber Sale Program, Timber Demand, and the Timber Land Base.

The Timber Resource

Tree Species

The forests of Southeast Alaska are part of the western hemlock-Sitka spruce forest type. This type is a segment of the temperate rain forest that occupies a coastal strip 2,000 miles long from southern Oregon to southcentral Alaska. The most extensive stands are in Southeast Alaska and most stands of commercial quality are located with 10 miles of tidewater.

Individual tree species and species occurrence vary by location, topography, drainage, soil type, and stand history. Western hemlock and Sitka spruce stands cover 98 percent of the land capable of growing industrial wood in Southeast Alaska (Revision data base, Query 21, May 1991). The remaining two percent of the forest land supports western redcedar, Alaska-cedar, and cottonwood.

Western hemlock (*Tsuga heterophylla*) is the major single timber stand component, growing on 54 percent (Revision data base, Q21, May 1991) of the total area capable of growing industrial wood products. Western hemlock treats well, has good strength and nailing characteristics, and good to excellent pulping characteristics. This species is used for pilings, poles, railway ties, and construction lumber; it is an important fiber source for pulp.

Sitka spruce (*Picea sitchensis*), the second largest single stand component, covers 4 percent (Revision data base, Q21, May 1991) of lands capable of producing industrial wood products. Sitka spruce is traditionally used for such speciality products as: sounding boards for high-quality pianos; guitar faces; ladders; construction components of experimental light aircraft; oars, planking, masts, and spars for custom-made or traditional boats; and turbine blades for wind energy conversion systems. This wood has a high strength-to-weight ratio and excellent sound-producing characteristics.

Stands classified as hemlock-spruce (mixed conifer) inhabit 40 percent (Revision data base, Q21, May 1991) of the lands capable of growing industrial wood products.

The remaining timber in most stands, approximately 2 percent (Revision data base, Q21, May 1991) by acreage, is evenly divided between Western redcedar (*Thuja plicata*) and Alaska-cedar (*Chamaecyparis nootkatensis*). These species were utilized by Alaska's original inhabitants, the Tlingit and Haida. Western redcedar was used to make large canoes up to 60 feet in length. Alaska-cedar provided paddles, cedar bark, the sails and lines. Houses were covered with hand-split cedar or spruce planks and totem poles were constructed of cedar. Today redcedar is primarily used as a roofing material. However, it is also used in utility poles, fence posts, piling, clothes closets and chests, caskets, crates, and fishtrap floats. Alaska-cedar is suitable for boat building, utility poles, heavy flooring, framing, bridge and dock decking, marine piling, toys, musical instruments, and carving; the wood is highly regarded in Japan.

Tree species of limited commercial value include red alder (*Alnus rubra*), shore pine (*Pinus contorta var. contorta*), and black cottonwood (*Populus trichocarpa*). Because there is no commercial market for them, these species are not considered industrial wood products.

Silvicultural Practices

Clearcutting, with reliance on natural seeding from adjacent timber borders or blocks, is the most commonly used silvicultural system in the Sitka spruce-western hemlock type on the Tongass National Forest. Harvest unit sizes are typically 25 to 100 acres. From 1980 through 1990, the average annual clearcut acreage was approximately 9,300 acres for a total of 102,157 acres.

Clearcutting is used where timber production is the primary land use and where it is determined to be the optimum method. The clearcutting method is used for the following reasons: exposure to the sun raises soil temperature, which speeds decomposition of the surface organic layer, thereby improving the productivity of the site; the regeneration of Sitka spruce is favored by destroying advance hemlock regeneration and it creates more favorable sites (such as disturbed soil and light) for post-logging reproduction of spruce; it eliminates residual overstory trees infected with dwarf-mistletoe, which prevents infection of western hemlock in the new stand (Harris and Johnson, 1983); and logging costs are lower than with other systems (see also Appendix G).

Clearcutting also minimizes windthrow and logging damage. Windthrow is a serious problem which increases when stands are opened up by partial cutting. Western hemlock and Sitka spruce are shallow-rooted species and along with Southeast Alaska's abundant rainfall, frequent fall storms, shallow soils, and complex topographic features make these species highly susceptible to windthrow. Clearcutting disturbs less area for a given amount of timber removed than does partial cutting. However, the chance of blowdown along cutting boundaries is increased. Management strategies have been developed to reduce wind damage, such as selecting windfirm cutting boundaries, shaping units to minimize length of cutting boundaries exposed to storm winds, and laying out cutting strips perpendicular to prevailing winds with progressive cutting of strips toward the wind (Ruth and Harris, 1979).

Western hemlock and Sitka spruce can be easily damaged by logging. These species tend to be shallow rooted and thin barked. Roots are easily damaged by compaction, heavy equipment, and fire. The thin bark is easily damaged by logging and is subject to subsequent wound infection by wood-rotting fungi.

The clearcut method has been a successful silvicultural practice on the Tongass National Forest. Prompt natural forest regeneration usually follows with harvest areas fully stocked or overstocked by tree seedlings. Overstocking is common. Natural regeneration is usually a combination of advanced hemlock regeneration remaining after harvest operations and new seedlings from seed cast by nearby trees. Both western hemlock and Sitka spruce are prolific seeders, and their light seeds are transported long distances. In Southeast Alaska, artificial regeneration by seeding or planting is used only in special situations: to increase the proportion of spruce over species of less value, in situations where sites are not expected to regenerate naturally within five years, and in situations to supplement existing stocking. Inadequate stocking can occur on streamside alluvial terrace sites where salmonberry and alder are significant competitors. Control of competing vegetation may be necessary in site-specific locations.

The practice of clearcutting has been, and continues to be, a controversial issue. A significant public concern about the practice continues to exist and it seems to be centered around esthetics and the loss of old-growth stands. The language in the FY 1991 Appropriations Bill directs the Forest Service nationally to reduce the level of clearcutting by at least 25 percent from the Fiscal Year (FY) 1989 levels by FY 1995. The direction notes that this reduction will occur in accordance with Forest Land Management Plans, that this is an overall goal, and that it does not necessarily apply to a specific forest. Nationally, the goal is to have no more than 183,500 acres of clearcuts in sold timber sales by the end of FY 1995.

Yarding Methods

Most logs are yarded downhill using cable logging systems such as highlead and skyline. Access is usually from valley bottoms because roadbuilding on steep slopes is difficult and costly. Most logging occurs inland with logs transported via road systems to log transfer facilities at tidewater. Harvest by tractor has been limited; it is not practical on most of the soils and topography found on the Tongass. Winter yarding on frozen ground has been conducted to minimize impacts to the shallow soils. However, due to the normally short period of time the ground can be expected to be frozen to the point where disturbance can be minimized, winter yarding techniques are not considered to be dependable. The amount of volume removed during this time is generally low due to the need for snow removal to access sites, short duration of frozen conditions, and other economic considerations.

Brush Disposal/Site Preparation

The common practice is to leave logging slash unburned or untreated. Because of Southeast Alaska's wet climate, fire danger is low, slash deteriorates rapidly, and valuable advanced reproduction that survived the logging is usually present.

Timber Stand Improvement

The acres of timber stand improvement (primarily precommercial thinning) have averaged about 5,600 acres per year from 1980-1990.

Precommercial thinning involves the thinning of very young stands of trees (usually less than 20 years old) to improve the spacing and species composition; to remove surplus, damaged or diseased trees; and to optimize the growth of the remaining trees until the next harvest cycle.

The improved growth increases the expected timber board foot volume at the next harvest cycle. This, in turn, increases the future timber inventory and could allow for raising the current harvest level. This increase in the current harvest level is often referred to as the "Allowable Cut Effect" (ACE).

In developing the Tongass Land Management Plan, it was estimated that the allowable sale quantity (ASQ) could be raised by 34 million board feet per year by thinning 6,300 acres annually. Subsequent tests of the Allowable Cut Effect indicate that, if anything, the effect gained from thinning was more than that predicted by TLMP (1985-86 TLMP Amendment, Appendix C).

Second-Growth Management

Silvicultural practices for intensive management of young growth are still in the early stages of development. During the mid-eighties a Second Growth Management Program (SGMP) was started by the Tongass National Forest. Cooperators included the Forestry Sciences Laboratory and State and Private Forestry. Commercial thinning demonstration projects were established on the Thorne Bay and Petersburg Ranger Districts. Precommercial thinning demonstration projects were established on the Thorne Bay, Craig, and Petersburg Ranger Districts. The objectives were to increase multiple resource outputs from second-growth forests with primary emphasis on production of wood fiber and Sitka black-tailed deer habitat. An additional project was developed to determine fish habitat relations in second-growth forests.

Timber Supply

The supply (such as annual harvest) of wood products to the timber industry in Southeast Alaska averaged approximately 685 million board feet (net sawlog and utility volume) per year between FY 1980 and 1990; it has ranged from 497.8 to 1,074 million board feet. (A sawlog is defined as a tree at least nine inches in diameter at breast height, capable of producing a log twelve feet in length with a top diameter of six inches, and greater than 33 1/3 percent sound "usable" wood. Utility logs are defined as logs with less than 33 1/3 percent net sawlog volume (the volume that can be used for sawn wood products) but containing at least 50 percent firm usable pulp chips.) Sources of this timber supply are the Tongass National Forest, private corporations (principally Alaska Native Corporations formed through ANCSA), State of Alaska, and imports. The average annual supply from the Tongass National Forest was 304 million board of sawtimber and 52.2 million board feet of utility logs. The sawtimber volume has ranged from 162.5 to 428.3 million board feet. During the early eighties, the Tongass program supplied about 72 percent of the annual harvest in Southeast Alaska and Native Corporations about 21 percent. However, the harvest from Native Corporations increased dramatically in 1983 and continued through 1990. The Native Corporation contribution has averaged 51 percent of total supply from 1983 through 1990 and the Tongass contribution has averaged about 46 percent. This information is displayed in Table 3-111.

The Tongass Timber Reform Act (Section 705) requires the Forest Service to provide an annual sale quantity which is responsive to annual market demand and the market demand for the planning cycle, to the extent consistent with providing multiple-use and sustained-yield of all forest resources.

Table 3-111

Timber Supply from Southeast Alaska, FY 1980-1990 (Million Board Feet, Log Scale)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Average
Tongass National Forest												
Sawtimber	428.3	339.5	326.6	220.0	226.7	162.5	251.4	282.0	331.5	377.1	399.0	304.1
Utility[1]	51.8	47.8	43.8	30.0	34.0	69.5	39.1	54.2	64.7	67.0	72.0	52.2
State of Alaska												
Sawtimber	32.5	38.1	26.2	20.9	14.3	3.3	10.4	16.1	13.5	13.5	3.1	17.4
Utility	0.5	0.7	0.0	0.1	0.5	0.5	0.2	0.3	0.1	0.1	1.0	.4
Native Corporations												
Export Sawlog	83.0	31.6	137.0	249.3	202.3	225.3	295.9	286.1	286.4	419.8	441.7	241.7
Pulplogs[2]	61.8	35.4	22.3	42.6	56.0	46.6	-0.4	110.0	121.3	192.9	44.6	66.6
BIA	12.8	4.7	2.8	3.1	1.1	0.1	0.0	0.0	0.0	3.5	0.0	2.6
SE AK Sawlog	**556.6**	**413.9**	**492.6**	**493.3**	**444.4**	**391.2**	**557.7**	**584.0**	**631.4**	**813.9**	**843.8**	**565.8**
SE AK Total	**670.7**	**497.8**	**558.7**	**565.9**	**534.8**	**507.8**	**596.6**	**748.5**	**817.5**	**1073.9**	**961.4**	**685.0**
Imports												
Sawlogs	33.0	27.1	3.1	21.1	5.7	7.8	24.4	5.7	0.1	1.8	1.2	11.9
Pulplogs	0.0	0.0	0.0	2.0	38.0	11.9	22.1	5.1	6.8	1.9	0.0	8.0
Wood Chips[3]	0.0	0.0	0.0	0.0	15.6	0.0	0.0	0.0	0.0	0.0	0.0	1.4

Source: USDA Forest Service, Alaska Region

[1] Utility volume includes logs with less than one-third net sawlog volume but contains at least one-half firm usable pulp chips. The Tongass Land Management Plan does not include utility logs or residual chips in the annual allowable sale quantity of 450 million board feet.

[2] Native Corporation harvests from Southeast Alaska are estimated.

[3] Wood chips are converted to log scale at a ratio of 2.7 short tons per million board feet.

Tongass Timber Sale Program

Maintaining timber supply opportunities for the Southeast Alaska timber industry was a major objective of the 1979 Tongass Land Management Plan and the Alaska National Interest Lands Conservation Act (ANILCA, Report Number 9). The Tongass timber program is part of a long-term cooperative effort among the federal government, the State of Alaska, and local governments to provide greater economic diversity in Southeast Alaska and more year-round employment. The Forest Service established requirements to process timber in Alaska, including the construction and operation of pulpmills via 50-year timber sale contracts.

The Tongass National Forest's timber sale program is composed of the long-term sales (50-year contracts) program, the short-term or independent sales (typically less than 7 years) program, and the firewood/personal use program. Approximately two-thirds of the timber volume made available each year on the Tongass National Forest goes to long-term sales.

Prior to the early 1950's, the average annual timber harvest on the Tongass was about 45 million board feet per year. Since establishment of the long-term contracts around 1952, timber harvest has averaged approximately 364 million board feet per year. This volume has been generated primarily from the Ketchikan, Wrangell and Sitka Unit Sales.

Table 3-112 and Figure 3-29 depict the annual combined harvest of sawlog and utility volume on the Tongass.

Table 3-112

Tongass National Forest timber harvest history by calendar year[1] 1909-90 and by fiscal year[2] for the period 1952-1990 (sawlog and utility volume)

Calendar Year	Tongass Volume (sawlog)	Calendar Year	Tongass Volume (sawlog, utility)	Fiscal Year	Tongass Volume (sawlog, utility)	Harvested Acres by Fiscal Year
1909		1952	63.4	1952	58.0	1,460
		1953	59.2	1953	49.5	1,340
to		1954	109.2	1954	66.8	1,710
		1955	213.8	1955	179.3	4,530
1916	234.5	1956	230.2	1956	215.8	5,440
1917	41.0	1957	226.4	1957	253.6	7,620
1918	43.1	1958	167.5	1958	195.7	6,080
1919	37.4	1959	266.6	1959	218.3	4,750
1920	45.6	1960	347.5	1960	314.8	8,150
1921	11.7	1961	338.2	1961	347.4	10,170
1922	20.6	1962	366.3	1962	339.2	8,890
1923	40.5	1963	395.1	1963	180.5	5,160
1924	48.6	1964	443.7	1964	415.7	11,520
1925	53.7	1965	397.6	1965	424.6	11,750
1926	51.0	1966	474.3	1966	439.6	10,750
1927	52.0	1967	474.3	1967	450.5	11,300
1928	33.8	1968	529.5	1968	541.3	13,900
1929	42.0	1969	519.3	1969	518.7	13,480
1930	38.5	1970	560.1	1970	493.0	10,910
1931	18.2	1971	527.7	1971	584.2	17,160
1932	14.7	1972	547.5	1972	532.4	13,320
1933	14.7	1973	588.5	1973	590.7	14,850
1934	28.2	1974	544.0	1974	559.6	14,190
1935	30.5	1975	408.4	1975	462.4	11,660
1936	40.0	1976	462.8	1976	444.3	11,210
				1976	109.6	2,770 [3]
1937	35.3	1977	447.3	1977	456.3	12,450
1938	25.6	1978	398.7	1978	414.0	12,770
1939	26.5	1979	453.2	1979	422.2	11,180
1940	30.9	1980	452.1	1980	480.1	9,040
1941	35.8	1981	385.7	1981	386.7	7,910
1942	38.5	1982	344.9	1982	370.7	7,610
1943	73.6	1983	251.2	1983	250.5	7,850
1944	86.8	1984	249.8	1984	261.0	3,830
1945	58.3	1985	265.3	1985	231.3	4,590
1946	48.6	1986	271.6	1986	290.5	8,267
1947	83.4	1987	351.5	1987	336.2	8,606
1948	81.0	1988	407.7	1988	396.2	9,677
1949	49.2	1989	408.0	1989	443.1	13,470
1950	54.4	1990	472.6	1990	471.0	13,997
1951	52.9	1991	-	1991	-	-

	Calendar Year 1909-1990	*Fiscal Year 1952-1990*
Total Harvest:	**16,142.0 (MMBF)**	**14,195.3 (MMBF)**
Average Yearly Harvest:	**196.8 (MMBF)**	**364.0 (MMBF)**

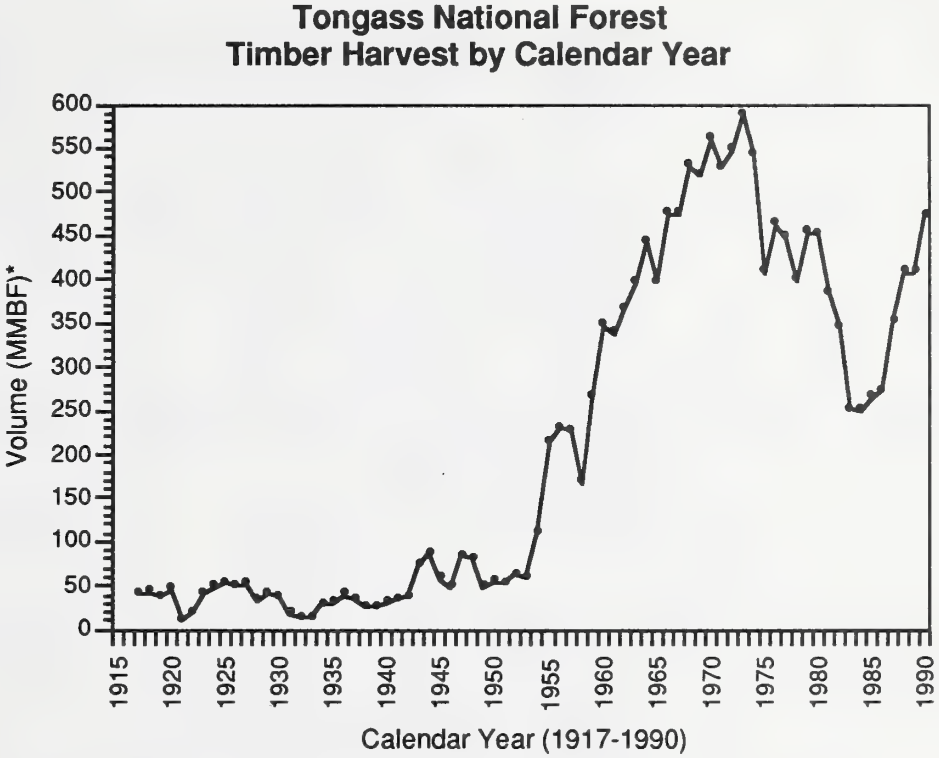
Source: Timber Management, Region 10, May 16, 1990

[1] Calendar Year = January 1-December 31

[2] Fiscal Year = October 1-September 30

[3] This is the transition quarter for the year when Congress changed the fiscal year from July 1-June 30 to October 1-September 30.

Figure 3-29



*Net saw and utility volume by calendar year

Source: R10-TM, 5/91

Allowable Sale Quantity

An allowable sale quantity is the maximum quantity of timber that may be scheduled during the plan period (10-15 years). The Tongass's current allowable sale quantity (ASQ) is 4.5 billion board feet per decade. Since 1980, the average annual volume of timber made available to industry by the Forest Service has been 426 million board feet per year, of which 398 million board feet per year has been actually sold for short-term sales or released for the long-term sales. Tongass timber is considered available to industry when it has been offered for sale in the short-term sales or units have been released to the operators in the long-term sales. Volume is "released" when harvest units are approved in the Long-Term Sale Final Environmental Impact Statement and Record of Decision, ground verified for harvest, and appraised.

The ASQ calculation is based on the amount of commercial forest land made available by the plan. This quantity is expressed as a board foot measure and is calculated in accordance with applicable timber utilization standards specified in the Regional Guide, the number and type of acres available for timber management, and the intensity of timber management.

The 1984 Tongass Evaluation Report identified the need to verify the ASQ in light of the many changes that had occurred since its original calculation. Specifically, the process was to determine if the ASQ for the Tongass National Forest was affected by changes in land status

due to the conveyance of lands to Corporations and the State of Alaska, and the establishment of final Wilderness Area boundaries; changes in timber utilization standards; changes in timber programmed harvest direction; and by the original modeling limits imposed on timber activities for visual resource values (See the Tongass Plan, 1985-86 Amendment, Appendix C).

The conclusion drawn from this verification effort was that the changes described in the Tongass Evaluation Report had not adversely affected the original allowable sale quantity calculation of 4.5 billion board feet per decade (4.65 billion board feet less 0.15 million board feet held in reserve for anticipated land selections). However, the land status changes and corrections to the planning model have resulted in minor changes in each Administrative Area's contribution to the overall allowable sale quantity. Slight changes in the distribution of the programmed harvest by volume class were also necessary. The current Administrative Area contributions to the allowable sale quantity are displayed in Table 3-113. (See the Tongass Plan, 1985-86 Amendment, Appendix C, Table 7 for detailed display of volume class contributions by Administrative Area.)

Table 3-113

Verification of the TLMP 4.5 Billion Board Feet (MMMBF) per decade ASQ

Administrative Area	Volume (MMMBF)	Remarks
Chatham Area	1.206	1.301 MMMBF less .095 MMMBF held in reserve for land selections
Stikine Area	1.091	None
Ketchikan Area	2.203	None
Tongass National Forest	**4.500**	4.595 MMMBF less .095 MMMBF held in reserve for land selections

Source: TLMP 1985-86 Amendment

Annual Accomplishments

During the eleven-year period from 1980 through 1990, the average annual offer was 426 million board feet. Approximately 93 percent of that annual offer has been sold and 76 percent harvested. Table 3-114 and Figure 3-30 compare the amount of timber that has been made available, sold, and harvested on the Tongass National Forest since Fiscal Year 1980. Table 3-115 displays accomplishments by volume class and source.

Table 3-114

Timber volume offered, sold, and harvested for fiscal years 1980-1990 (million board feet)[1]

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Average
Short-term timber sales program												
Volume Offered	176	151	115	184	178	136	84	98	82	78	47	121
Volume Sold	173	144	75	69	45	36	174	150	62	81	25	94
Volume Harvested	114	125	132	46	50	32	50	63	83	126	149	88
Long-term timber sales program												
Volume Available	347	394	363	275	298	298	298	298	255	243	287	305
Volume Harvested	314	215	195	174	177	131	201	219	249	251	250	216
Total Tongass timber sales program												
Volume Offered	523	545	478	459	476	434	382	396	337	322	331	426
Sold/Available	520	538	438	344	343	334	472	448	317	340	286	398
Volume Harvested	428	340	327	220	227	163	251	282	332	377	399	304

Source: USDA Forest Service Timber Supply and Demand Report, Report No. 8, August 1989 Region 10, Program, Planning and Budget, Chart 1, February 1990, Updated with FY 90 data May 1991 using STARS data base.

[1] Net thousand board foot (MBF) Sawlog Volume

Figure 3-30

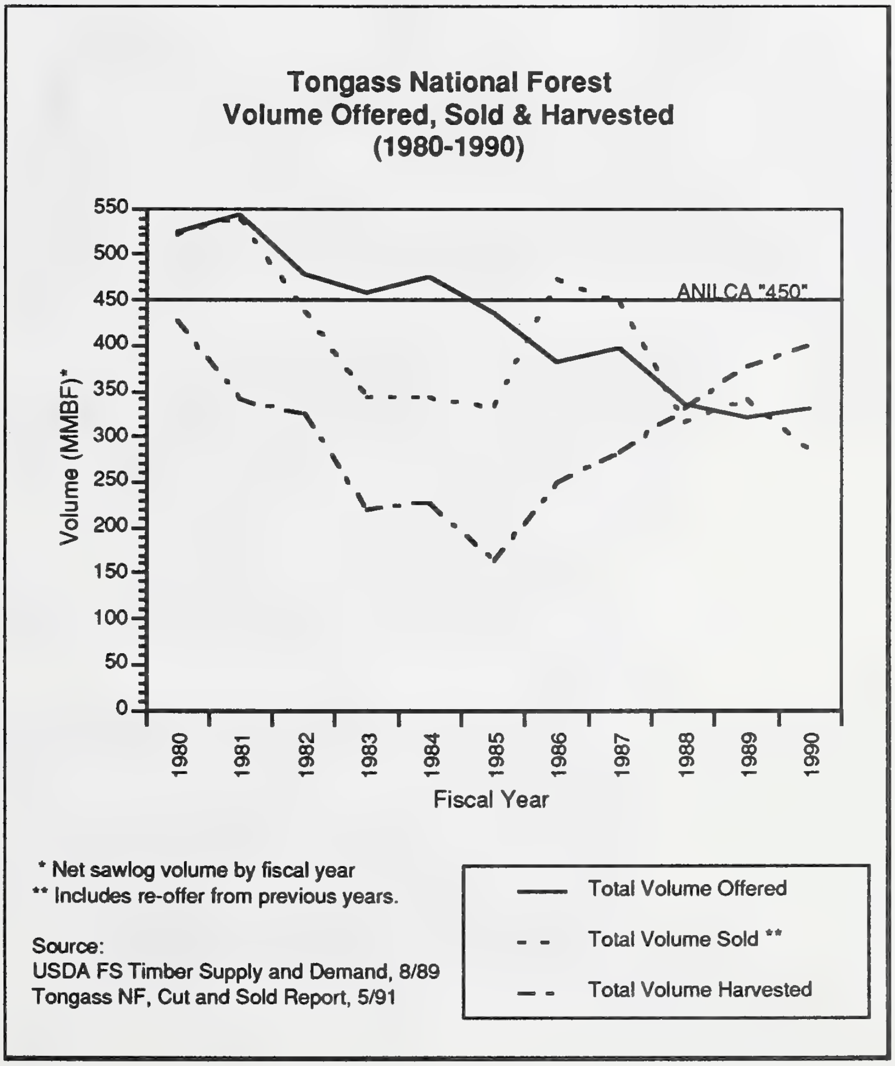


Table 3-115

Average annual accomplishments by volume class and source in fiscal years 1980-89 (Thousands of acres)

Volume (MBF/Acre)	Plan Goal[1]	Made Available			Sold or Released		
		Short-term	Long-term	Total[2]	Short-term	Long-term	Total
8-20	4.7 (27%)	1.1	1.6	2.7 (19%)	0.6	1.5	2.1 (18%)
20-30	6.6 (38%)	3.1	3.6	6.7 (47%)	2.0	3.5	5.5 (46%)
30-50	4.5 (26%)	1.0	2.6	3.6 (25%)	0.7	2.5	3.2 (27%)
50+	1.5 (9%)	0.4	0.8	1.2 (8%)	0.3	0.8	1.1 (09%)
Total Acres	**17.3 (100%)**	**5.6**	**8.6**	**14.2 (99%)**	**3.6**	**8.3**	**11.9 (100%)**
Total Volume (MMBF)	**450.0**	**128.0**	**307.0**	**435.0**	**101.0**	**307.0**	**408.0**

Volume (MBF/Acre)	Plan Goal[2]	Total Acres Made Available	Total Acres Sold or Released	Acres Harvested
8-20	4.7(100%)	2.7(57%)	2.1(45%)	1.0(21%)
20-30	6.6(100%)	6.7(102%)	5.5(83%)	3.3(50%)
30-50	4.5(100%)	3.6(80%)	3.2(71%)	2.7(60%)
50+	1.5(100%)	1.2(80%)	1.1(73%)	0.8(53%)
Total Acres	**17.3(100%)**	**14.2(82%)**	**11.9(69%)**	**7.8(45%)**

Source: ANILCA Section 706(a), Report No. 8 (1988) updated with 1989 data.

[1] Total acres under the plan goal include 970 acres per year from the allowable cut effect and 523 acres per year of advanced logging. While these 1,493 acres were not disaggregated by volume class in the Forest Plan, they are broken down into their appropriate volume classes in this table.

[2] Monitoring of the Forest Plan is measured by decade on both volume class and the total volume actually sold in short-term sales or released to the long-term operators. Total acres by volume class or total volume made available may exceed the Forest Plan goal for a given year or for the decade as long as the amount actually sold or released is not greater than the goals established in the Forest Plan. Harvest by volume class or total volume is not used as monitoring or control standard since the scheduling and rate of harvest is controlled by the operator and is tied to contract periods and not Forest Plan periods.

Forest Plan Volume vs. Harvested Volume

Since 1980, the net sawlog volume per acre harvested on the Tongass has averaged approximately 39 MBF (thousand board feet) per acre (Table 3-111 and Table 3-115). The 1979 Forest Plan estimated the average net sawlog volume to be approximately 26 MBF per acre. There are several factors contributing to this difference:

- The Forest Plan's volume per acre estimate was based on the average volume per acre of each volume class strata. In practice, selection of harvest units are normally in the more economical portion of the volume class strata, having a higher volume recovery than the average.

- The current timber inventory indicates that there is variation within each volume class strata, especially the net volume per acre. There are stands within the strata that vary significantly from the anticipated average. For example, volume class 4 (Strata A), the lowest volume per acre strata, has individual stands that have volume per acre greater than the average for volume class 7 (Strata D), the highest volume per acre strata. Volume harvested from high volume stands within lower volume strata contribute to higher volume per acre harvested than anticipated.

In recent years, after the timber market improved, the actual volume per acre harvested has averaged much closer to the Forest Plan goal. For example, Fiscal Years 1989 and 1990 have averaged 28 thousand net board feet per acre.

There have been reports that the volume per acre harvested from the Tongass National Forest has averaged much more than our calculations indicate. One common error is confusing inventory volume with scale volume. Timber inventory volume is calculated on the basis of 16 foot logs. Scale volume used 32 foot log volume formulas. The difference is significant due to the amount of taper in the log being scaled. On the Tongass, a factor of .77 is used to convert from inventory 16 foot log volume to scale 32 foot log volume. Using the 29 thousand board foot per acre average harvested between 1980 and 1989 as an example, the inventory equivalent would be more than 50 thousand board feet per acre. If utility volume is included, the 39 thousand board feet per acre (net scale sawlog) becomes 55 thousand board feet per acre (inventory sawlog plus utility).

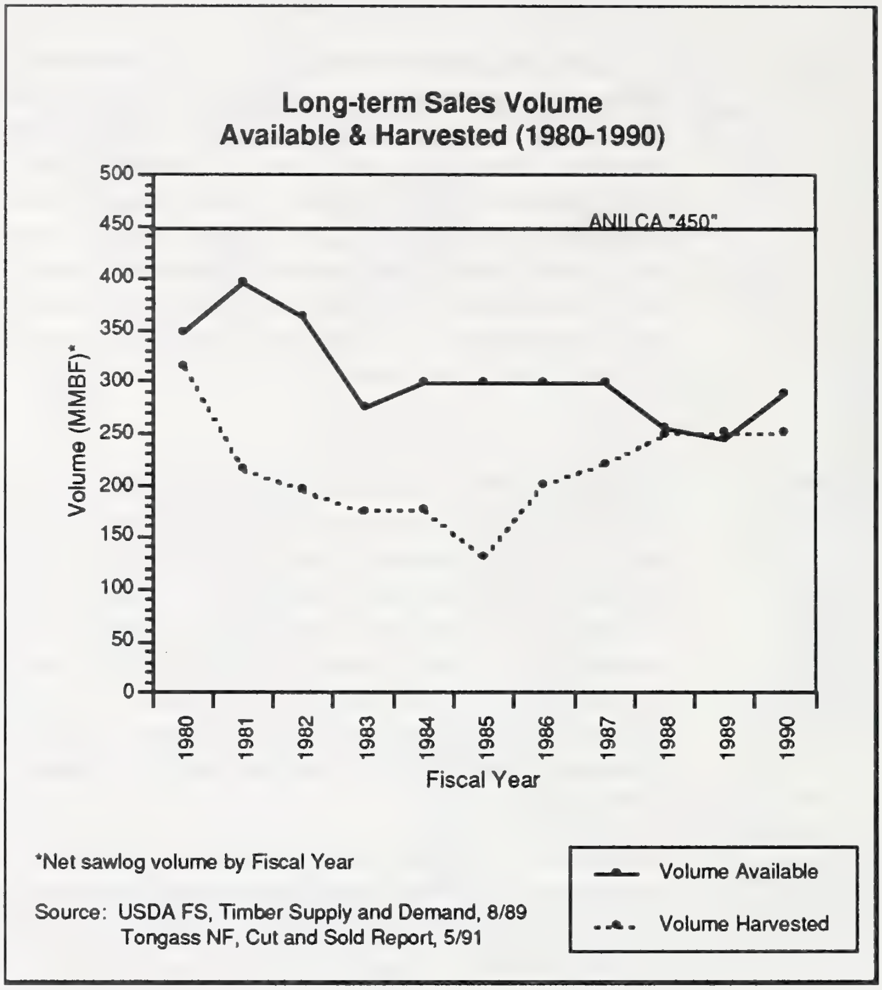
Long-Term Timber Sales Program

During the 1920's, the Forest Service proposed long-term sales to help establish a pulp industry in Southeast Alaska. The objective was to provide a sound economic base in Alaska through establishment of a permanent year-round pulp industry. The first successful sale was made in 1951, and the construction of a pulpmill was completed at Ward Cove near Ketchikan in 1954. During the 1950's the Forest Service offered three additional long-term sales. The belief was that to attract the timber industry to Alaska, a long-term assured supply of timber was necessary. All four sale contracts were initially of 50-years duration and required pulp mill construction. To establish the industry, the Forest Service was committed to spending more on Southeast Alaska timber sales than was netted by receipts from those sales (Backiel and Baldwin, 1987).

Long-term sales make up about two-thirds of the timber volume made available each year on the Tongass. Since Fiscal Year 1980, an annual average of 305 million board feet of net sawlog volume has been made available to the long-term contract holders. Due to market fluctuations since 1980, an annual average of only 216 million board feet of net sawlog volume has been harvested. In addition to the sawlog volume, approximately 52 million board feet of utility log volume has been harvested under long-term contracts for the same period.

Figure 3-31 compares the amount of timber released and harvested on the long-term sales since Fiscal Year 1980.

Figure 3-31



Two of the 50-year timber sale contracts are no longer operating. The US Plywood-Champion Paper in the Juneau unit was cancelled by mutual consent in 1976; no operations had been performed on-the-ground. The Pacific Northern Timber Company (PNT) Contract located on the Wrangell Unit required the construction of both a sawmill and pulpmill. This requirement was reduced to the construction of a sawmill only, and the contract was shortened to 25 years. All ground activities for the Wrangell Unit were completed in 1981 (R10, Timber Management, Contract Files).

The remaining two contracts still operate on the Tongass. Holders are the Ketchikan Pulp Company (KPC), a wholly-owned subsidiary of the Louisiana-Pacific Corporation, and the Alaska Pulp Corporation (APC), an American Corporation owned by Japanese interests. The Long-Term Contract Boundaries map in the map packet identifies the original sale areas encompassed by the two remaining contracts. As stipulated in their contracts, each company built a pulp mill, Ketchikan Pulp near Ketchikan and Alaska Pulp near Sitka. In return, the government assured KPC and APC a total of about 13.3 billion board feet of timber over a period of 50 years. The KPC contract expires in 2004; the APC expires in 2011.

As of October 1, 1990, approximately 40 percent of the 13.3 billion board feet is still owed. This equates into annual harvest of 202 million board feet for 14 years on the KPC contract and 118 million board feet for 21 years on the APC contract (Table 3-116).

Table 3-116 displays the four long-term timber sale contracts made on the Tongass National Forest after 1950, their original contract lengths, date of execution, original volume, volume remaining as of October 1, 1990, and the termination dates of these contracts.

Table 3-116
Long-Term timber sale contracts of the Tongass National Forest

Unit	Ketchikan Unit	Sitka Unit	Wrangell Unit	Juneau Unit
Operator(s)	KPC/LPK	ALP/APC	Alaska Wood Products/PNT	U.S. Champion Plywood
Length of Contract	50 Years	50 Years	50 Years then reduced to 25 years by Regional Forester	50 Years
Contract Date	July 26, 1951	October 15, 1957	June 9, 1954	September 12, 1968
Original Volume Board Feet	8,250,000,000	4,974,700,000	693,107,000	8,750,000,000
Remaining Volume 10/1/1990	2,776,617,000 (Sawlog and Utility)[1]	2,458,016,000 (Sawlog and Utility)[2]	0[3]	0
Contract Termination Date	June 30, 2004	June 30, 2011	December 31, 1981	Cancelled in 1976 No Volume Harvested
Remaining Years	13.75 years	20.75 years		
Average Annual Volume per Year Remaining	201,935,000 (Sawlog and Utility)	118,458,000 (Sawlog and Utility)		

Source: R10 Timber Sale Accounting records

[1] Original sale was for net sawlog volume only. In 1984 utility volume was made part of the long-term sale volume.

[2] Original sale was for net sawlog volume only. In 1990 utility volume was made part of the long-term sale volume by the Tongass Timber Reform Act.

[3] PNT Sale activities on-the-ground completed in 1981. Contract not closed at present due to appeal pending by purchaser concerning redetermined rates for the last five-year period.

Tongass Timber Reform Act. With the passage of the Tongass Timber Reform Act (TTRA), Congress mandated nine unilateral changes (Sec 301(c)(1-9)) to the two remaining long-term contracts (APC and KPC). These changes relate to or affect sale planning, proportionality, utility log volume, rejection of timber, purchaser road credits, and timber pricing. The contract modifications have all be completed.

The Tongass Timber Reform Act Sec. 301(c)(3) requires that the harvest of high volume old-growth (volume classes 6 and 7) will not be at an accelerated rate. The Act requires that the proportion of harvest in volume classes 6 and 7 will not exceed the proportion of volume of these classes currently represented in a contiguous management area. Provision B0.64 has been added to both long-term contracts to assure proportional harvest over the remainder of each contract term. During the remainder of the long-term contracts, the Forest Service will limit the acres specified for harvest in volume classes 6 and 7 (combined) to no more than the ratio that these volume classes represent of all volume classes currently in the timber base, as of enactment of the Tongass Timber Reform Act (November 18, 1990). The objective is that at

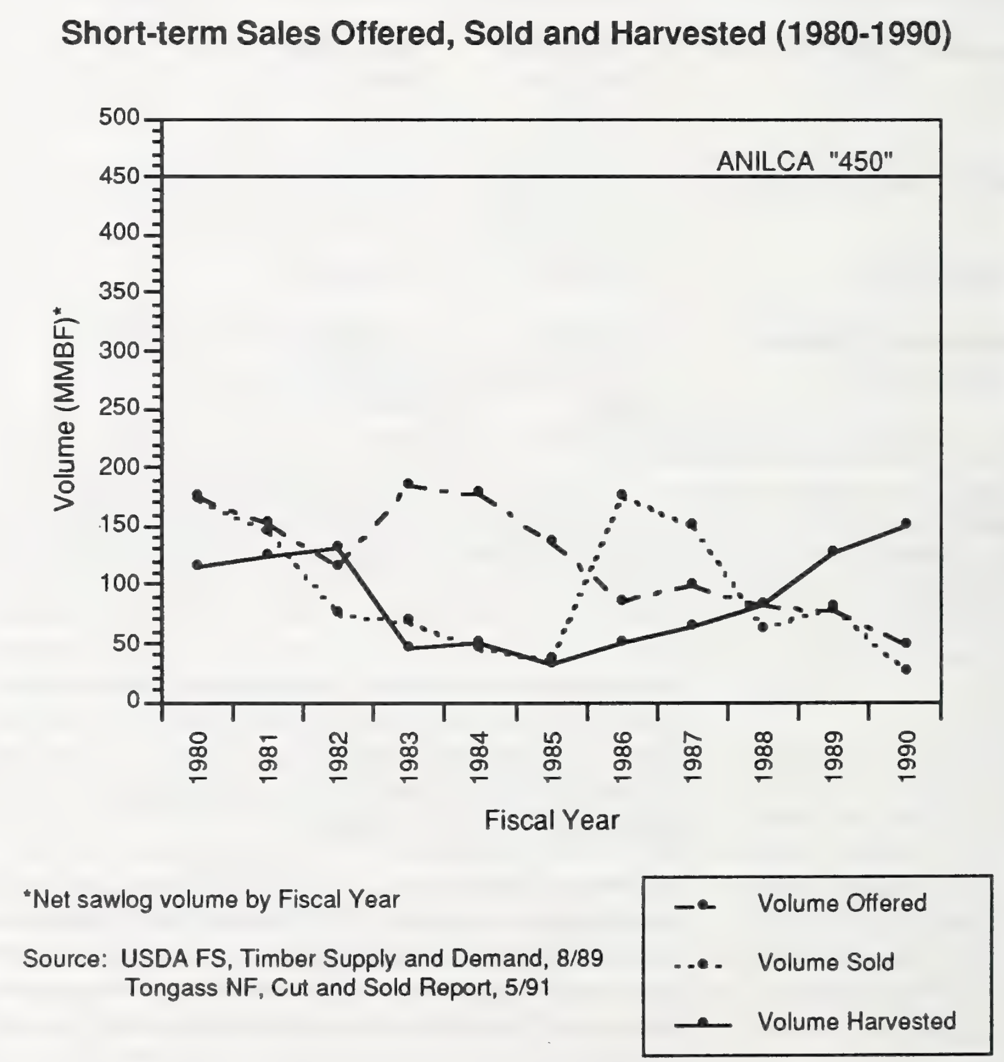
the expiration of the long-term contracts, there will be the same proportion of volume classes 6 and 7 remaining in each Management Area as currently exist within the timber base of the Management Area. Specific details regarding the implementation and the assessment of proportionality are documented in the Timber Sale Preparation Handbook.

Short-term Timber Sales Program

An average of 121 million board feet of net sawlog timber has been offered in short-term timber sales between 1980 and 1990. Short-term timber sales are those sales which range in duration from a few months to seven years with volumes ranging from single trees to about 50 million board feet. Of the 121 million board feet, 94 million board feet have been sold annually, and 88 million board feet have been harvested.

Figure 3-32 compares the amount of timber offered, sold, and harvested from short-term timber sales since Fiscal Year 1980.

Figure 3-32



*Net sawlog volume by Fiscal Year

Source: USDA FS, Timber Supply and Demand, 8/89
Tongass NF, Cut and Sold Report, 5/91

SBA Program

In 1977, the U.S. Forest Service began offering short-term sales for small businesses only. These sales were intended to promote opportunities for small timber businesses and are free of competition from large firms. The Small Business Association (SBA) set-aside program defines a small business having no more than 500 employees. The SBA volume represents an average of 66 percent of all short-term sales offered on the Tongass. However, essentially all short-term timber sales since 1981 have been purchased by qualified small business contractors (ANILCA, Status of the Tongass National Forest, Fiscal Year 1989).

Since 1980, qualified small businesses, have purchased 485.6 million board feet of SBA set-aside volume. The number of bidders successfully purchasing SBA sales has varied from one in 1978 to as many as 14 in 1983 and 1987. SBA mill operations in Southeast Alaska are composed of two active mills: Klawock Timber Alaska, Incorporated (Klawock), and Chilkoot Lumber Company (Haines).

The Tongass Timber Reform Act (Sec. 105) amended the National Forest Management Act (NFMA) to permit qualified small business purchasers to elect to have the Forest Service construct specified roads. Prior to the Tongass Timber Reform Act, small business concerns in Alaska did not have this option. In addition, the Tongass Timber Reform Act directs the Forest Service to provide a supply of timber to those purchasers qualifying as "small business concerns" under the Small Business Act, as amended, (SBA) (15 U.S.C. 631 et req.), provided that it is consistent with providing for the multiple use and sustained yield of all resources, and subject to appropriations.

Firewood/Personal Use Program

The Tongass National Forest allows free use timber, fuelwood, and other products, with the exception of green-standing sawtimber, to be gathered from Federal lands without permit. This timber is provided for residents of the State by request, at a rate of 10 thousand board feet (MBF) of sawtimber or 25 cords of wood annually. Firewood is the primary use of this timber with houselogs, lumber, and floatlogs being other uses.

Sources of free use products are found primarily along existing road systems or beaches adjacent to Federal lands. Beached logs are found around pulp mills and rafting routes. In towns where mills do not exist, rafting of timber is limited, and road systems are not extensively developed adjacent to Federal lands (for example, Juneau), free use products are limited or not available. In these areas, overharvest of these limited resources can be a management problem.

Timber Sale Economics

Many members of the public surfaced below-cost timber sales as an issue. The Forest Service defines a below-cost timber sale program as one in which the previous three-year average expenditures exceed revenues as reported in the Statement of Timber Sale Revenues and Expenses (Financial Account), Timber Sale Program Information Reporting System (TSPIRS). There is currently much discussion on how to analyze available timber sale information so that an assessment of below-cost sales can be made. Of particular concern are the type of analysis (such as cash flow or cost efficiency), the scope of analysis (such as, Forest-wide, area-wide, individual projects, per acre or some combination), the time frame of the analysis (such as, annual or multi-year), and which benefits or revenues and costs should be included.

The Tongass National Forest operates under a series of statutes requiring certain land management practices that may not result in net returns to the Treasury. These include the Organic Administration Act of 1897, the Multiple-Use Sustained-Yield Act of 1960, the National Environmental Policy Act 1969, the Resources Planning Act of 1974, the National Forest Management Act of 1976, and the Alaska National Interest Lands Conservation Act of 1980. The primary objective of National Forest management is to maximize net public benefits, whether the benefits are captured in revenues to the Treasury or not (Leonard, 1991).

The special funding provisions of ANILCA Section 705(a) recognized that a portion of the timber supply fund would be used to make uneconomical timber sales more attractive by supplemental funding. Legislative history indicates that the actual intent of ANILCA Section 705(a) was to prevent impounding funds which would be needed to implement the Tongass Land Management Plan (Backiel and Baldwin, 1987). Congress, through the Tongass Timber Reform Act (Section 705), repealed the special funding provisions of Section 705(a) of ANILCA.

Based on public concern over the benefits and costs of timber sales, Congress directed the Forest Service to develop a system that would show all timber-related benefits and costs. The Timber Sale Program Information Reporting System (TSPIRS) is an effort to improve the way information is developed and displayed to help public understanding of timber management. This reporting system was developed jointly with the General Accounting Office (GAO) and the Forest Service.

TSPIRS presents a comprehensive picture of the financial, economic, and socio-economic aspects of a National Forest timber program. This system provides a single year "snapshot" within the integrated long-term resource management program proposed in the Forest Plan. The annual TSPIRS data is used to measure the financial efficiency of the Tongass timber sale program. Table 3-117 displays TSPIRS data for the years 1987-1990 (the first four years of the program). The present net values of the Tongass National Forest Timber Sale Program have been positive for the four reporting periods.

TSPIRS provides an accrual-based income statement that was designed to Generally Accepted Accounting Principles (GAAP). Some have recommended the use of simple cash flow statements of receipts and disbursements to determine timber sale program costs. TSPIRS recognizes the asset values that the public receives as part of the timber sales, such as a road system that is available for multiple-use. Cash statements do not recognize that the benefits, revenues, and costs occur over a period of years (8-10 years). However, beginning with the FY 1991 TSPIRS Report, the Forest Service has agreed to provide an annual cash flow statement for comparison purposes.

The TSPIRS process was audited in FY 1988 by GAO and in 1989 by an independent public accounting firm. Both audits recommended changes to bring TSPIRS into compliance with GAAP. The Senate further recommended that TSPIRS provide information on appeals/litigation costs, firewood/personal use sales costs, and NEPA compliance costs. In response to the recommendations, the Forest Service has implemented changes to TSPIRS (Leonard, April 25, 1991).

The Forest Service is making an effort to improve Timber Sale Program cost efficiency. These efforts include changes to the below-cost timber program policy and a review of procedures that may affect cost-efficiency.

Table 3-117

Tongass National Forest Timber Sale Program Information Report (Thousands of dollars)

	FY 87	FY 88	FY 89	FY 90
Report 1				
Total Revenue	5,905	10,977	21,111	36,615
Total Costs	14,536	12,606	14,893	17,970
Gain/Loss Before State Payments	-8,631	-1,629	6,218	18,645
Payments to the States	0	256	4,989	8,886
Gain/Loss After State Payments	-8,631	-1,885	1,229	9,759
Report 2				
Present Value Benefits				
Timber	2,374	2,821	25,972	38,197
Wildlife	0	271	0	0
Recreation/Wildlife Utilization	192	108	27	0
Commercial fish	398	486	3,913	2,101
Total Present Benefits	**2,964**	**3,686**	**29,912**	**40,298**
Negative Effects				
Wildlife	0	71	612	790
Fisheries	0	30	0	0
Total Negative Effects	0	101	612	790
Present Value Costs				
Timber	2,419	2,157	18,200	19,305
Wildlife	160	0	0	0
Commercial Fish	117	35	822	659
Roads	0	81	47	17
Recreation	0	0	0	0
Total Present Costs	**2,696**	**2,273**	**19,069**	**19,981**
Present Net Value	**268**	**1,312**	**10,231**	**19,527**
Report 3				
Employment (Number of Jobs)	2,305	3,385	3,859	4,082
Income	105,000	118,000	120,000	135,931
Value of Federal Income Tax	16,000	0	24,000	25,827
Payments to States	0	256	4,989	8,886
Total Timber Volume Harvested				
Sawlog Volume (MMBF)	282	332	337	399
Utility Volume (MMBF)	54	64	67	72
Regeneration Acres Treated	890	5,314	7,908	7,924
Precommercial Thinning Acres	8,819	0	2,414	2,688
Miles of Road to Support Timber Program				
Miles New Road Construction	57	39	8	27
Miles Road Reconstruction	98	100	149	123

Source: Region 10, PP&B, TSPIRS 1987-1990 Data

An internal review of program cost-efficiency has been completed. The review provided recommendations to assist Forests to achieve optimum efficiencies. The intent is to ensure that Forests are not operating at below-cost levels because of inefficient methods or procedures in implementing their timber programs.

A below-cost timber program policy was published in the Federal Register on April 16, 1991; the goal for implementation is March 1992. The proposed policy states that the Forest Service intends to operate commercial sale programs only where the resulting benefits exceed the costs. Below-cost sales programs are defined as those programs where the previous three-year average net revenue, as reported in TSPIRS, before payments to States, is negative. However, the policy also recognizes those circumstances where a below-cost program will continue if the overall long-term benefits of the program outweigh the costs. If adjustments to the timber sale program are appropriate, the adjustments would be completed through a Forest Plan amendment or revision. The policy would not apply to the firewood and personal use sales programs.

Timber Demand

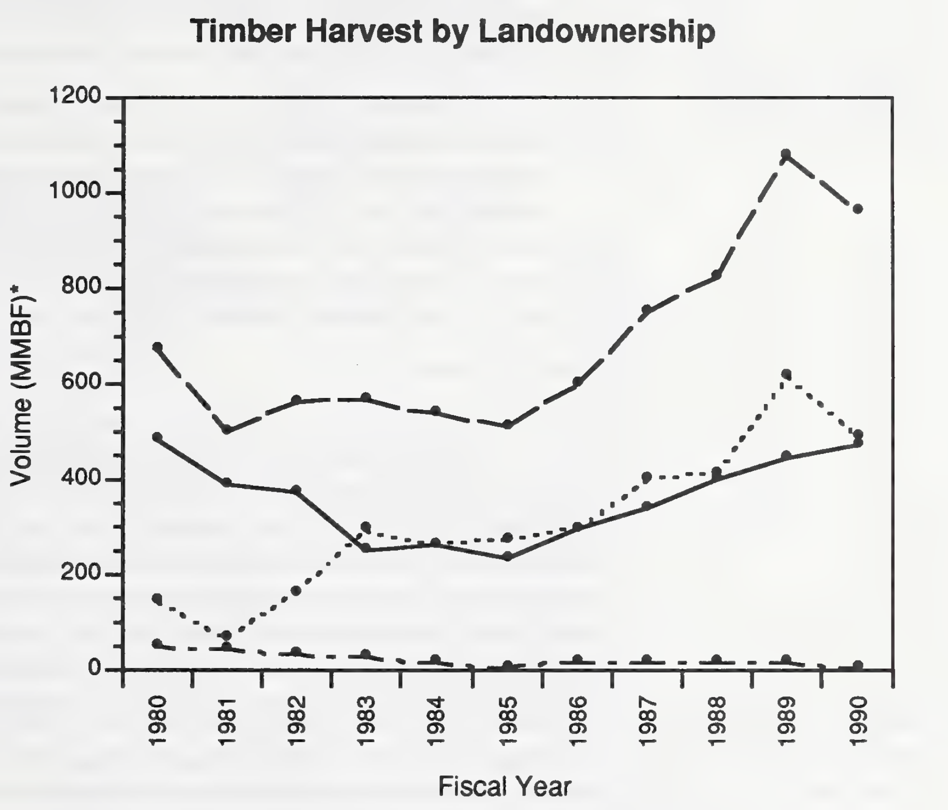
The Tongass Timber Reform Act amended ANILCA Section 705(a) to require the Forest Service to provide an annual sale quantity which is responsive to annual market demand and the market demand for the planning cycle, to the extent consistent with providing for the multiple-use and sustained-yield of all forest resources.

National Forest timber harvests peaked in 1973 and demand declined until 1985; demand has been steadily increasing since 1985 (Figure 3-33).

Depressed timber markets in 1982 created a temporary reduction in demand for National Forest timber products (GAO Report, 1988). The timber industry could not afford to purchase timber sales with limited contract lengths and, in some cases, could not afford to harvest timber already under contract with the Forest Service. Time frames for preparing timber sales may be up to ten years. The time frames are due to environmental analysis requirements, permitting requirements of the State of Alaska and other Federal agencies, budget constraints, and litigation. Many sales ready for offer after 1982 had originated in the early to mid-1970's. The timber market, industry needs, and budget commitments during that time did not anticipate the sudden downturn in market price experienced during the early 1980's. Much of the volume offered in the early 1980's and not sold was purchased in the latter part of the 1980's when market price began to recover.

In response to the lower harvest rates of Tongass timber between 1982 and 1986, the Forest Service modified its timber harvest and road construction policies. The objective of the current timber sale program is to balance timber supply with the anticipated needs of purchasers, including construction of public roads and facilities. The current policy for timber sales is to base offerings and road construction on harvest levels from the previous year with adjustments for anticipated changes in the market for forest products.

Figure 3-33



*Net sawlog volume by fiscal year.

Source: USDA Forest Service, Alaska Region.

Some have argued that the decline reflected a long-term decline in the demand for National Forest timber, and, therefore, Tongass National Forest timber sales and harvest goals should be reduced (Haynes and Brooks, 1990). There are several factors which influence the harvest of timber from the Tongass National Forest (ANILCA Sec. 706(a), Report Number 8):

- Alaska Native Claims Settlement Act (ANCSA). This act established 13 Native Corporations in Southeast Alaska that were entitled to select about 550,000 acres of land from the Tongass National Forest. Most of these lands have been conveyed to the corporations during 1979 and 1980. Timber harvest from these lands steadily increased from the early eighties with a subsequent rise in exports; with most of the harvest exported to Asian countries. Asian markets generally prefer round logs over processed products in order to maintain or increase employment in their own domestic industries.

- Exchange Rates. The monetary contraction of the United States economy, which resulted in a rapid rise in interest rates between 1979 and 1981, led to an appreciation in the value of the dollar. The increase in the dollar's value between 1981 and 1985 made exports comparatively more expensive. This appreciation shifted demand away from processed products to the least processed form (such as round logs).
- U.S. Economic Expansion from 1981 through 1986. The appreciating dollar increased the demand for Asian imports by U.S. consumers and created a trade imbalance, which resulted in huge dollar surpluses in several Asian countries. In addition, the rate of inflation declined, resulting in declining interest rates—which boosted housing starts—and lowered the return from holding dollars, which resulted in a fall in the value of the dollar. The net effect was to increase the buying power of the Asian countries, which resulted in an increased demand for Tongass timber.

Industry Capacity

The current structure of Southeast Alaska's lumber and wood products industry is dominated by five sawmills and two pulp mills. A new sawmill began production in spring 1989 in Ketchikan. These five sawmills and a number of small portable mills produce cants, flitches, and dimension lumber for export. Cants and flitches are semi-processed, rough-sawn logs meeting federal primary manufacturing requirements. The two pulp mills produce dissolving pulp for both the U.S. domestic and export markets. Approximately 78 percent of the wood supply used by the two pulp mills comes from the Tongass National Forest. Alaska's dissolving pulp (special alpha grade) is produced from wood fibers, and is a basic ingredient for rayon, cellophane, and other specialized industrial and aerospace materials.

The pulp and log capacity of the Southeast milling operations are shown in Table 3-118. This capacity is represented as the maximum available for Southeast Alaska wood processing mills. The actual capacity at which mills operated in Southeast Alaska between 1980 and 1989 has been influenced by the availability of timber and the markets available for products produced. Only two years (1988 and 1989) during the last ten were sufficient amounts of timber from Southeast supplied to run mills near full capacity. A large portion of this supply was exported as round logs from Native lands and not manufactured in Southeast mills.

Timber Markets

Because most of the markets within Alaska are small and transportation costs to U.S. markets are high, the Alaska timber market is essentially an export market (Haynes and Brooks, 1990). Alaska forest products—lumber, dissolving pulp, and logs—are shipped throughout the world, but most shipments are to Pacific Rim countries. In total, the value of forest product exports from Alaska has tripled over the last four years, rising from $204.5 million in 1985 to more than $612 million in Fiscal Year 1989 (ANILCA Sec 706(b), Report No. 3). Japan has been, and remains, the single most important market for all products. In Fiscal Year 1989, Japan imported 36 percent of the value of Alaskan pulp exports, 81 percent of the value of log exports, and 99 percent of the value of lumber exports (ANILCA Sec 706(a), Report No. 9).

Table 3-118

Southeast Alaska wood processing capacity (Net Saw and Utility Log million board feet Volume/Year)

Firm	Pulp Log MMBF/Yr	Capacity Pulp M Ton/Yr	Chip Log BDU/Yr	By-Products Equivalent MMBF/Yr	Sawlog Capacity MMBF/Yr
Alaska Pulp Corporation	170	192	-	-	-
Ketchikan Pulp Company	190	200	-	-	-
Ketchikan Sawmill (KPC)	-	-	30,000	15	40
Klawock Timber AK[1]	-	-	75,000	30	65
Wrangell Forest Products	-	-	120,000	48	120
Annette Sawmill (KPC)	-	-	67,000	27	70
Chilkoot Lumber Company[1]	-	-	45,000	18	50
Other Small Mills[1]	-	-	-	-	35
Totals (878 MMBF)	**360**	**392**	**337,000**	**138**	**380**

Source: USDA-Forest Service, Alaska Region and Operator-furnished data.

[1] Small Business Qualified (SBA)

Projected Demand

Researchers at the Pacific Northwest Experiment Station analyzed the demand for all Alaska timber and timber products. This analysis was designed to contribute to the Tongass National Forest's land management planning process. The results are documented in a report entitled An Analysis of the Timber Situation in Alaska: 1970-2010 (August, 1990) and is a summary of a more detailed report (in press). The report covers production and export of forest products from Alaska, markets for Alaska forest products, Alaska's competitors, issues in Pacific Rim forest products trade and projections of forest products output.

The research indicates that international market demand is sufficient to support further increases in timber harvest on the Tongass. Given the assumption that the Tongass National Forest timber supply will be roughly constant, harvest from the Tongass National Forest necessary for total supply to meet expected demand is predicted to remain near 400 million (approximately 193 million sawlog, 25 million export log, and 180 million pulp logs) board feet per year from 1990 to 2010. Table 3-119 displays timber harvest by owner, harvest by product, and productions of forest products from 1970 to 2010. Total harvest, from all sources, is expected to average 660 million board feet per year during the early 1990's, and 545 million feet per year between 1995 and 2005. This projection assumes that private ownership will supply about 350 million board feet in 1990, 165 million board feet by 1995, and 100 million board feet in 2005. The State of Alaska, imports and other sources are expected to contribute 45 million board feet. This information is shown in Table 3-119. However, a separate estimate by the Alaska Forest Association places the market demand for Tongass National Forest at 565 million board feet or higher.

Table 3-119

Summary of historical and projected periodic Alaska timber harvest by owner, harvest by product, and production of forest products, 1970-2010[1]

A - Timber Harvest by owner and timber imports (in million board feet)

Period	All owners	National Forest	Private	Other Public	Timber imports
1975	554.7	489.4	17.7	54.6	0.0
1980	537.4	411.0	133.8	46.1	25.5
1985	572.7	280.7	266.2	25.8	34.5
1990	787.5	381.5	376.0	30.0	13.7
1995	595.5	403.5	162.0	30.0	15.0
2000	538.2	403.2	105.0	30.0	15.0
2005	527.1	397.1	100.0	30.0	15.0
2010	530.8	400.8	100.0	30.0	15.0

B - Harvest by product[2] (in million board feet)

Period	Total	Export Logs	Lumber	Pulp (roundwood equivalent)
1975	561.1	42.9	292.8	225.5
1980	524.9	149.5	188.5	87.0
1985	567.7	318.4	114.2	135.2
1990	783.2	399.1	168.7	215.4
1995	595.5	181.4	192.7	221.4
2000	538.2	123.5	227.6	187.1
2005	527.1	117.0	227.6	182.5
2010	530.8	117.0	225.8	188.0

C - Production of forest products[3]

Period	Export Logs	Lumber	Pulp	Wood Chips
	(million board feet)		(thousand short tons)	
1975	42.9	341.2	298.8	56.5
1980	149.5	239.9	324.9	83.7
1985	318.4	125.7	296.1	4.6
1990	399.1	185.8	379.6	35.4
1995	181.4	217.8	387.5	44.5
2000	123.5	262.8	362.0	51.2
2005	117.0	268.5	353.2	49.8
2010	117.0	270.9	356.3	48.3

Source: Haynes and Brooks, 1990.

[1] Data are averages centered on the year they are reported for, except 2010 reports the average for 2008-2010. Annual data are reported in Brooks and Haynes (in press).

[2] Data are estimated for 1975, 1980, and 1985, see Brooks and Haynes (in press) for details. Data shown for 1900 include estimates for 1988 and projections for 1989-92; data for all other years are projections.

[3] Lumber and pulp production data include both offshore exports and (estimated) shipments to domestic markets. Wood chips are residuals from lumber production; only offshore exports are shown.

The Alaska Region will continue to assess whether or not the changing supply picture in British Columbia, the Pacific Northwest, and harvest from Native Corporation lands will affect projections. British Columbia is considering the possibility of prohibiting log exports and is facing increased environmental pressures. The spotted owl is affecting supply from National Forests in the Pacific Northwest. A recent local newspaper article (Juneau Empire, May 9, 1991) reported that the Japanese and Soviet Union are expected to sign a trade agreement shortly. The Soviet Union is expected to provide Japan with 6 million cubic meters of raw wood and 400,000 cubic meters of wood products in exchange for bulldozers and other heavy logging equipment.

Methodology and Scientific Accuracy

The researchers reviewed a series of six studies, collectively known as the Alaska Timber Market Studies (ATMS). Their approach was to look at the past two decades, examine current market conditions, consider prospective changes in markets, and formulate an outlook for Alaska timber harvests to the year 2010. The methodology used to develop the projections began with estimating Alaska forest products output (by product), which was followed by calculating the raw material requirements necessary to support this production. Projected National Forest harvest is the quantity of timber that would be required to satisfy projected demand given harvest by other owners.

The major assumptions used in developing the projections followed from the historical data and drew heavily on recent analyses of Pacific Rim and Alaska forest products markets, including the ATMS studies. The major assumptions in these projections are summarized below:

- Japan will continue to be a major market for North American sawn wood, and 95 percent of Alaskan production is expected to go to Japan.
- There will be a steady but modest growth in Japanese sawn wood consumption, and imports will account for an increasing share of the consumption.
- Dissolving pulp will be the primary grade produced by Alaskan mills (90 percent); markets are expected to remain strong, except for those years where slow economic growth is forecast.
- Volume of export logs will decline in direct proportion to the decline in private timber harvest and most (80 to 90 percent) of what is harvested will go to export markets. Most observers expect harvest by private owners (Alaska Native Corporations) to decline from current levels; however, the timing and the extent of the drop in harvest are disputed.

Summary of Projections

The overall result from the projection data is that there will be an increasing demand for sawlogs in Southeast Alaska. Total sawnwood production is expected to increase and pulp production is expected to remain roughly stable. In addition:

- Production of logs for export is projected to fall sharply after 1990, as a consequence of the decline in private (Native Corporation) timber harvest. The decline in private harvest affects total Alaska harvest and log export projections, but has little effect on projected National Forest harvest. This is a direct consequence of the assumption that the majority of private timber will continue to be exported as logs (Brooks and Haynes, 1990).
- Production of lumber (including cants) is expected to increase over the next two decades, from a trough in 1985.
- Pulp production is also expected to remain high and roughly stable, although it will decline from the capacity-limit level of the late 1980's.

- Wood chip exports are expected to continue.
- Trends in the derived demand for timber are similar to projected trends in product output.
- The demand for pulp logs will decline to about 40 percent of total National Forest harvest, compared to 53 percent for 1980 to 1988. (Approximately 25-35 percent of fiber requirements for pulp are derived from residues from sawn-wood production.)
- Dependence on export markets is expected to continue.

Sensitivity Analysis

The sensitivity of the projections were tested by making changes in the assumptions. Five alternative projections were analyzed (Table 3-120). The general conclusion was: the projections of the derived demand for National Forest Timber were not extremely sensitive to significant changes in the major assumptions. This is based on the assumptions specific to each projection, and on the general assumption that there are no structural changes in markets.

Table 3-120
Demand alternative projections (Haynes and Brooks, 1990)

Alternative Description	Base Projection	Alternative Projection	Derived Demand for NF Timber
1. Pulp Production shipped to domestic markets reduced 50%	Exports: 80%	Exports: 90%	Less than a 10% reduction by year 2010.
2. Softwood Lumber-Alaska's share of North American lumber exports to Japan is reduced to 2% (60% reduction)	5-6%	2%	20% reduction by year 2010. Demand for roundwood increases, because of reduced residue production from lumber products.
3. Japanese sawn wood consumption (annual growth rate reduced)	0.7%	0.5%	Almost equal to base projection
Export lumber to Japan (Alaska's share is reduced, and shipments to other markets are assumed to increase.)	95.4% (constant)	95.4% to 90% by year 2010)	
4. Alternative 3 plus access to Japanese markets is more restrictive. (Import market share).	33% (Increase to maximum in 1998)	25% (Constant 1999-2010)	8% reduction
5. Private timber harvest - Sustainable harvest rate is higher than base for all years in projection (majority of harvest is assumed to be exported)	100 MMBF	200 MMBF	5% reduction, and increase in log exports

Source: Haynes and Brooks, 1990.

Implications

Several factors were identified that have a particular influence on Alaska's competitiveness in world markets (Haynes and Brooks, 1990). The factors are:

- Relative delivered-product costs. These costs are composed of manufacturing costs, product transportation costs, and raw material costs (such as stumpage and logging costs). Alaska is at the high end of manufacturing and product transportation costs relative to other competing regions. Raw material costs differ widely across competing regions.

- Competition. Alaska is expected to face increasing competition from other producers in the Pacific Rim. The expanding production on private land in the Southern U.S. is expected to reduce markets for Pacific Northwest and British Columbia producers; these producers will probably put more marketing effort into Pacific Rim countries. However, Alaska's competitive advantage is in the production of premium products from the high concentration of raw material that is available. Alaska's marketing efforts will probably play an important role in expanding Alaska's markets.
- Exchange Rates. Alaska producers are more dependent on offshore markets and, therefore, more vulnerable to unfavorable changes in exchange rates.

Tongass Timber Land Base

The ability of the Tongass National Forest to supply timber is closely tied to the quantity and quality of lands allocated to timber production. The forested land base, which is 10,009,000 acres, can be divided into a productive component (land capable of growing commercial wood products) and a nonproductive component.

Productive Forest Lands

The productive forest land base (see Table 3-121) is composed of 5.76 million acres. Prior to the passage of the Tongass Timber Reform Act (TTRA), 28 percent of the productive acres were withdrawn from timber production (for Wilderness areas, Research Natural Areas, Experimental Forests, and Municipal Watersheds) and not available for timber harvest. With the passage of the TTRA, an additional twelve percent was withdrawn from the productive forest base (new legislated Wilderness areas, new legislated LUD II areas, and stream buffers). The remaining productive forest land base is 3.46 million acres. Approximately 89 percent of the productive forest base is greater than 150 years of age and is considered to be "old-growth".

Table 3-121
Productive Forest Land (PFL) in thousands of acres

Category	Original Inventory (1950)	First Reinventory (1970)	TLMP Inventory (1977)	Second Reinventory (1980)	Before TTRA (1989)	After TTRA (1990)
Withdrawn or Not Available PFL	34	-	1,660	-	1,638	2,303
Old Growth	34	N/A	1,595	-	1,566	2,136
Young Growth	0	N/A	6	-	72	167
Available Productive Forest Land	4,521	6,109	4,413	4,178	4,125	3,460
Old Growth	4,097	5,681	4,076	3,720	3,543	2,973
Young Growth	424	428	337	458	582	487
Total Productive Forest Land	4,555	6,109	5,736	4,178	5,763	5,763
% Old Growth	91	93	93	90	90	89
% Young Growth	9	7	7	10	10	11

Source: R10, Timber Management November 17, 1989 and Revision data base, 5/91

Tentatively Suitable Land Base

Tentatively suitable acres are derived from the productive, non-withdrawn segment of the Tongass National Forest productive forest base. Tentatively suitable forest lands are those identified as having the biological capability, and availability, to produce industrial wood products. To be considered tentatively suitable, the forested land must:

- Be at least 10 percent occupied by trees or have formerly had such tree cover, and not be developed for non-forest uses;

- Be capable of harvest with available technology to ensure timber production without irreversible resource damage to soil productivity or watershed conditions;
- Be capable of being restocked within five years after final harvest; and
- Not be withdrawn from timber production by an Act of Congress, the Secretary of Agriculture or the Chief of the Forest Service.

Section 705 (d) of the Alaska National Interest Land Conservation Act (ANILCA) removed the National Forest Management Act's suitability determination requirement (Section 6(k)) for the Tongass National Forest, and the 1979 Tongass Land Management Plan did not formally make a tentatively suitable lands determination.) However, the Tongass Land Management Plan did designate productive forest as unavailable for timber harvest due to other multiple-use needs.

Congress, through the Tongass Timber Reform Act, amended ANILCA by deleting section 705(d) (16 U.S.C. 539d(d)) in its entirety. The Tongass Timber Reform Act (Sec. 102) requires that all provisions of section 6(k) of the National Forest Management Act of 1976 shall apply to the Tongass National Forest, except that economic factors need not be considered in the identification of lands not suited for timber production. Land suitability analysis has been completed for the Revision. (See Appendix A of the proposed Forest Plan for a detailed description of the process used to identify tentatively suitable lands for the Revision; and Analysis of the Management Situation, Timber, p. 3-419, January 1990.)

Prior to Tongass Timber Reform Act, the tentatively suitable land base was 3.06 million acres. As a result of Tongass Timber Reform Act, approximately 495,000 acres of tentatively suitable acres were withdrawn from timber production and classified as unsuitable; the tentatively suitable land base is now 2.56 million acres (25 percent of the total forested land area and 44 percent of the total productive land component). The reduction was the result of new Land Use Designation II (LUD II) areas (241,000 acres) (Sec 201), new designated Wilderness areas (126,000 acres) (Sec 202), and 100-foot minimum no harvest stream buffers (127,000 acres) (Sec 103). The acres determined as tentatively suitable are displayed in Table 3-122 and Figure 3-34.

Table 3-122

Tentatively Suitable Land Classification in acres

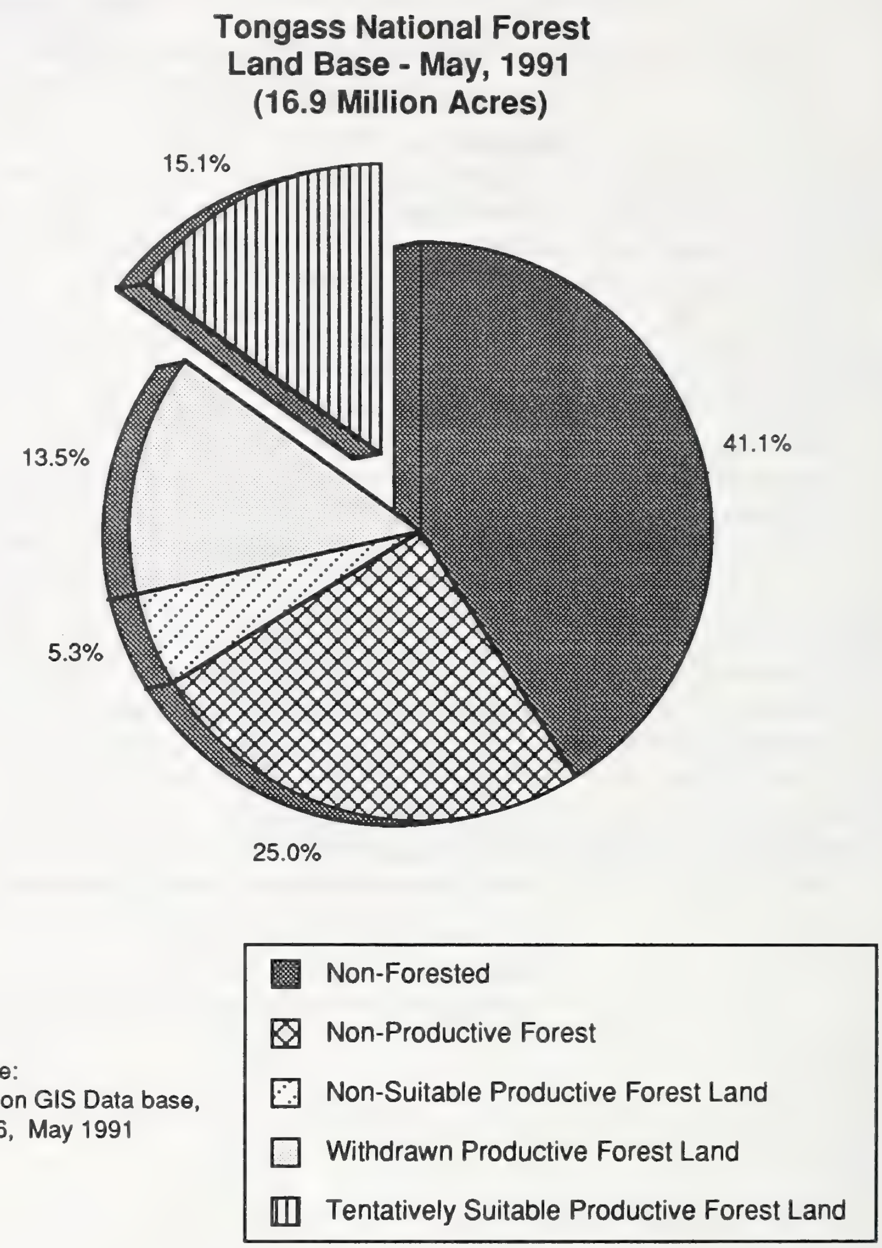
	After TTRA[1]	Before TTRA	Difference
Total National Forest Land Area	**16,997,181**	**16,997,181**	**0**
Withdrawn [2]			
TLMP Wilderness	5,634,347		
Experimental Forests	17,319		
Enacted Municipal Watersheds	9,773		
Research Natural Areas	12,263		
TTRA Wilderness Additions	299,697		
TTRA LUD II Additions	727,764		
TTRA Stream Buffers	296,278		
Total Withdrawn	**6,997,441**	5,673,702	1,323,739
Non-forest	4,131,504		
Non-productive Forest	2,407,783		
Productive Forest Not Suitable	898,892		
Not Capable	31,258		
Irreversible damage likely to occur	296,197		
Regeneration difficulty	81,809		
Inadequate response information	489,628		
Total Productive Forest Not Suitable	**898,892**		
Tentatively Suitable Forest Land			
TTRA Wilderness Additions			126,442
TTRA LUD II Additions			241,434
TTRA Stream Buffers			126,992
Total Tentatively Suitable Forest Land	**2,561,561**	3,056,429	494,868

Source: Revision GIS Data Base, Q1016, May 1991

[1] TTRA = Tongass Timber Reform Act

[2] Includes all acres (Non-forest, Non-productive Forest, and Productive Forest)

Figure 3-34

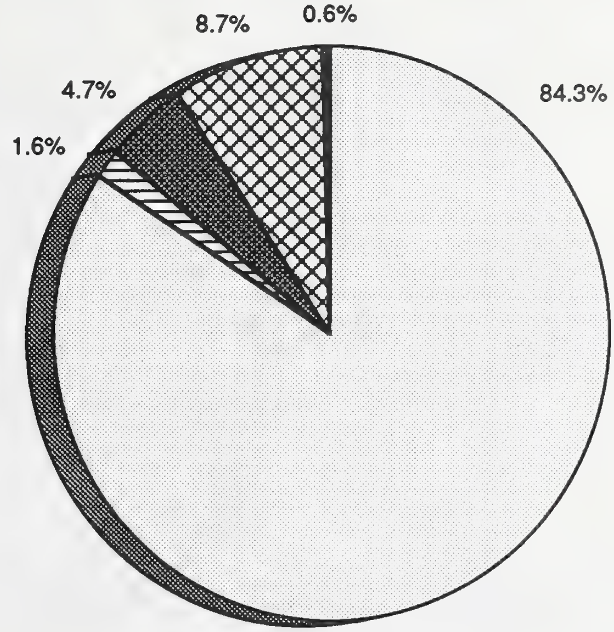


Source:
Revision GIS Data base,
Q1016, May 1991

Tentatively suitable acres by size class and operability distribution are displayed in Figures 3-36 and 3-37. Timber stands greater than 150 years of age occupy 84 percent of the tentatively suitable land base. The tentatively suitable acres by volume class are: 40 percent low volume (volume classes 3 and 4), 35 percent medium volume (volume class 5), and 11 percent high volume (volume classes 6 and 7); the remaining acres are composed of plantations and small pole stands (Figure 3-38). The nonsuitable productive forest acres by volume class are: 51 percent low volume, 35 percent medium volume, and 9 percent high volume acres. These acres have been withdrawn or are not suitable for various reasons.

Figure 3-35

Tentatively Suitable Forest Land by Size Class (2.56 Million Acres)



- Old-Growth Sawtimber
- Young-Growth Sawtimber
- Pole Timber
- Seedling/Sapling
- New Plantations

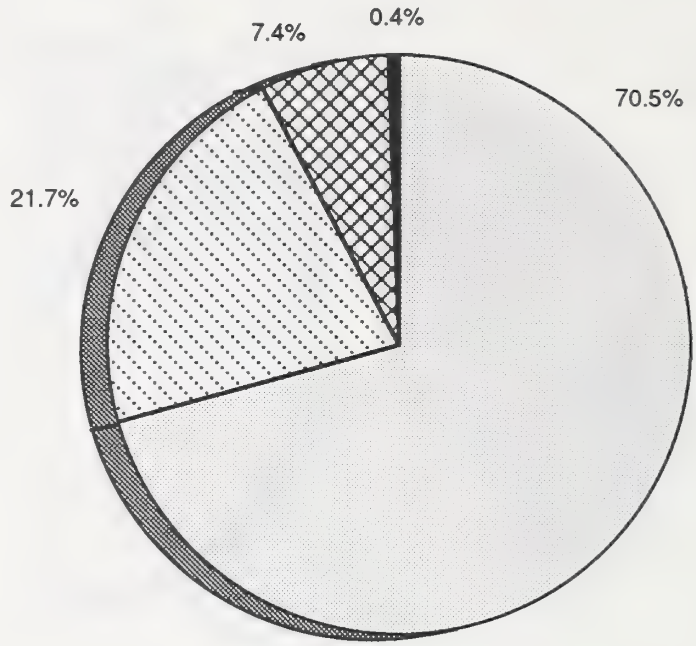
Source:
Revision GIS Data base,
Q1016, May 1991

Size Class	Acres
Old-Growth Sawtimber *	2,159,186 (84.3%)
Young-Growth Sawtimber**	40,847 (1.6%)
Pole Timber	121,447 (4.7%)
Seedling/Sapling	223,903 (8.7%)
New Plantations	16,096 (0.6%)

* More than 150 years of age
** Less than 150 years of age

Figure 3-36

Tentatively Suitable Forest Land by Operability Class (2.56 Million Acres)



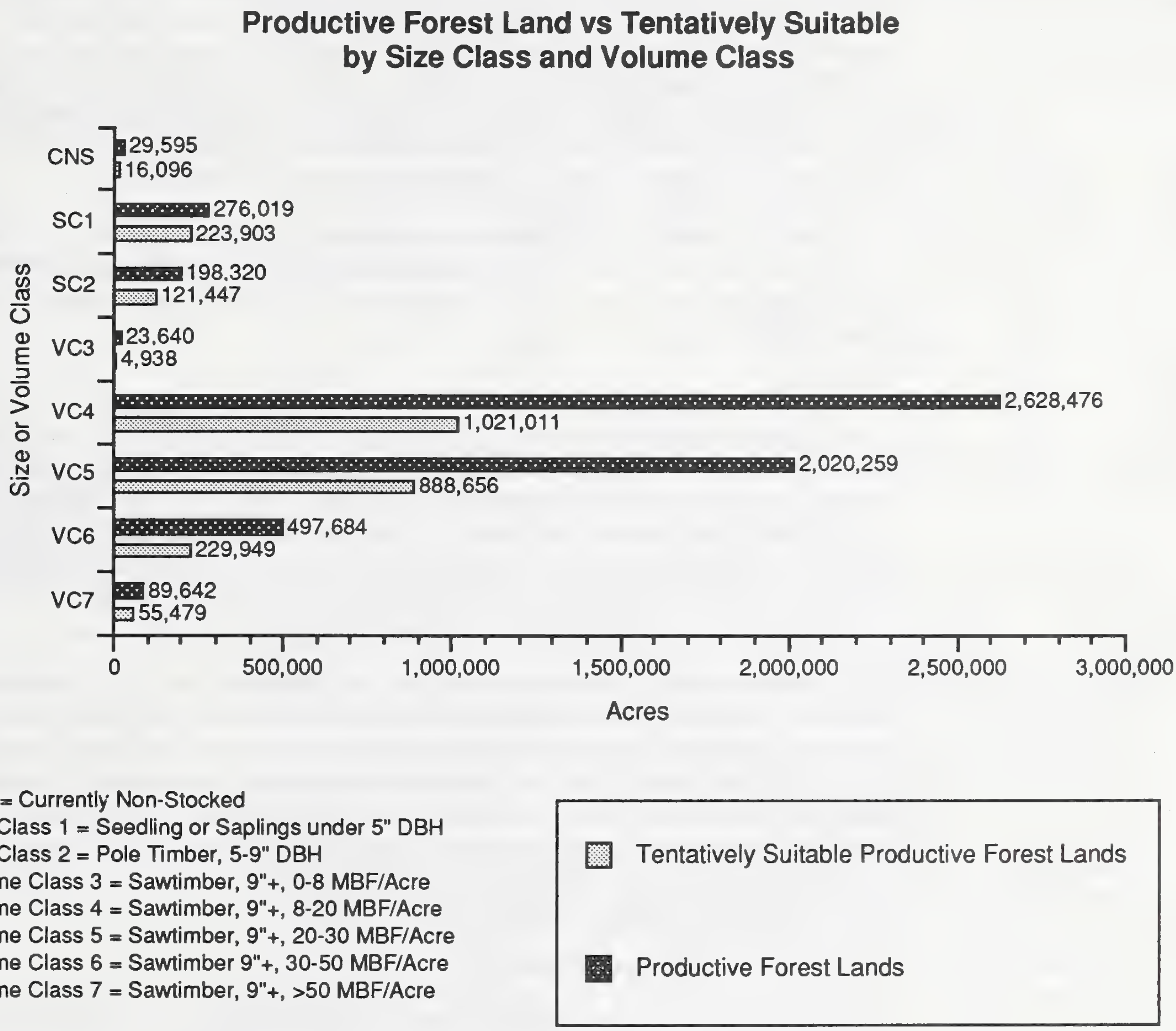
Operability Class	Acres
Normal	1,804,729
Difficult	555,908
Isolated	190,089
Unclassified	10,834

Normal
Difficult
Isolated
Unclassified

Source: Revision GIS Data base, Q1016, May 1991

"Operability" refers to timber harvest operability, and is defined as the type of timber harvest methods generally necessary to move the trees from stump to landing. There are three different classes of operability: normal (tractor and highlead cable), difficult (longspan skyline), and isolated (helicopter).

Figure 3-37



CNS = Currently Non-Stocked
Size Class 1 = Seedling or Saplings under 5" DBH
Size Class 2 = Pole Timber, 5-9" DBH
Volume Class 3 = Sawtimber, 9"+, 0-8 MBF/Acre
Volume Class 4 = Sawtimber, 9"+, 8-20 MBF/Acre
Volume Class 5 = Sawtimber, 9"+, 20-30 MBF/Acre
Volume Class 6 = Sawtimber 9"+, 30-50 MBF/Acre
Volume Class 7 = Sawtimber, 9"+, >50 MBF/Acre

Source: Revision GIS Data base, Q1016, May 1991

Timber Inventory

Sawlogs

The total standing sawlog volume on the Tongass National Forest is approximately 116 billion board feet (Bureau Long Log Scale) on 5.2 million acres of productive forest lands (Table 3-123). (The total productive component is 5.7 million acres; the remaining acres are unstocked or are seedling/sapling, or pole stands). A sawlog is a tree at least nine inches in diameter at breast height, capable of producing a log twelve feet in length with a top diameter of six inches, and greater than 33 1/3 percent sound "usable" wood. The predominant species of standing sawlog volume is western hemlock (65 percent), with Sitka spruce volume accounting for 33 percent. The remaining 2 percent is cedar and other species.

The tentatively suitable land base contains approximately 51 billion board feet (12.7 billion cubic feet) of standing sawlog volume. Approximately 14 billion board feet is located on land that was previously tentatively suitable, but as a result of the Tongass Timber Reform Act is no longer suitable.

Utility logs

Utility logs are defined as logs with less than 33 1/3 percent net sawlog volume (the volume that can be used for industrial wood products) but containing at least 50 percent firm usable pulp chips. The Tongass Land Management Plan addressed utility log volume by identifying an additional 96 million board feet annually in total timber harvest, consumption, and employment estimates (TLMP, 1979). The average annual utility volume harvested from the Tongass between 1980-1990 was approximately 52 million board feet, representing approximately 14 percent of the total harvest from the Forest for the same period.

The Plan Revision is using the same procedure as the 1979 Forest Plan. Utility volume will not be included in the Allowable Sale Quantity calculation (the allowable sale quantity is the maximum volume that may be scheduled during the planning period (10-15 years) to meet long-term production while providing for other resources). The Forest Inventory, used as the basis for determining the stand characteristics and yield tables for the Revision, does not include the utility volume component of the Forest. Utility volume is part of the gross volume and is aggregated with all nonmerchantable (cull) volume when calculating net sawlog volume (Planning Record, 1920-2-4 (G-12), November 7, 1988).

Inventory Methodology and Scientific Accuracy

The first Southeast Alaska-wide timber inventory began in 1953 and was completed in 1958. Due to the extensive area to be covered, the inventory was subdivided into Juneau, Sitka, Petersburg/Wrangell, Yakutat, and Ketchikan/Craig working circles. Ten years later, a portion of the original inventory was re-measured to improve estimates of growth and mortality trends in young growth stands in Southeast Alaska (Hutchinson and LaBau, 1975). Young growth stands are defined for timber management considerations as being less than 150 years old and normally less than 20 inches in diameter at breast height.

A complete reinventory program to reevaluate Southeast Alaska's forest area and volume began in the early 1970's and was completed by 1975. Several new categories of information were collected including data to evaluate level of stocking (the number of existing trees compared to full stocking of trees for a site), strata classes (timber categorized by several attributes such as species, decadence, stocking, site index and board feet per acre), soils, multiple-use objectives, slope, better definition of harvest categories, and a redefinition of quality guides. Detailed data, such as risk class and soil microsite, were collected on individual trees to better determine their potential for timber management considerations (Hutchinson and LaBau, 1975).

In 1979, an extensive point sampling system inventory developed for the Tongass Land Management Plan gathered specific information across the Tongass to provide specific information for the completed 1970's forest inventory. In the early 1980's, this inventory was redesigned by administrative area. Field data collection for this inventory was completed in 1985. Table 3-123 displays the results of this inventory.

Table 3-123
Forest inventory comparison (thousands of acres and millions of board feet)

	Productive Forest Land		Withdrawn PFL		Nonprod.	Nonforest	Total
	Area (M Ac.)	Volume (MMBF)	Area (M Ac.)	Volume (MMBF)	Area (M Ac.)	Area (M Ac.)	Area (M Ac.)
Chatham Area	2,230	40,589	1,114	20,676	1,423	4,506	8,159
Stikine Area	1,349	30,560	294	7,241	1,010	1,235	3,594
Ketchikan Area	2,184	45,394	895	19,491	1,813	1,247	5,244
Total Tongass	**5,763[1]**	**116,543[2]**	**2,303**	**47,408**	**4,246**	**6,988**	**16,997**

Source: USDA Forest Service Regional Office Revision Data base, 5/91

[1] Includes plantations and pole stands

[2] Bureau Long Log Scale

The 1980's inventory was designed to statistically achieve an estimate of the standing volume on the Forest. Sampling errors of area and volume which resulted met the requirements of FSM 2409.13. A review of the inventory methodology and results was conducted in September, 1989 by a Forest Service Biometrician from Region 1 (Northern Region, with headquarters in Missoula, Montana). He concluded that the results are reliable as an assessment of forest areas and volumes at the Forest and Area levels.

The forest inventory is a sound and statistically reliable source of information regarding Tongass timber production potential and stand characteristics. The data gathered through the inventory process was done on a Forest-wide basis and was designed to be specific only to the administrative area level. The inventory was not designed to collect all timber resource information nor was it designed for comparison of individual plot results to timber type map attributes.

Individual forest inventory plot volume class results were compared with the timber type map volume classes (Table 3-124). The purpose of the analysis was to determine if lower volume classes contained old-growth forested conditions which are important sources of old-growth wildlife habitat. Large variation was found between the timber type maps and the measured forest inventory plots. There are three reasons for this variation. First, the timber type maps assigned average attribute ratings for an entire polygon rather than specific points as was generated for the forest inventory. Second, the Tongass is composed of old-growth forest conditions which are heterogeneous in nature. Third, the forest inventory was not designed to be statistically precise enough to predict net cubic foot volumes on available productive forest land from the timber type map.

Table 3-124
Estimate of volume class distribution by volume class strata

Actual Volume Class	Type Map Strata by Volume Class: Seed/Sap	Pole	3	4	5	6	7	Total Plots
Seed/Sap	36	1	0	0	0	0	0	37
Pole	3	3	1	1	0	0	0	8
3	5	2	2	20	1	1	1	32
4	0	4	0	109	24	5	0	132
5	0	1	0	45	56	17	1	120
6	0	0	0	41	78	17	9	145
7	0	0	0	8	14	5	2	29
Total	**44**	**11**	**3**	**226**	**173**	**45**	**13**	**516**

Biological Potential Yield

The biological potential yield of the Forest (the amount of timber that could be produced on all forested lands) with no reductions for other resource considerations, technical problems, or workforce requirements, is approximately 1.3 billion board feet (Table 3-125). The potential yield on the tentatively suitable land base is .7 billion board feet.

Table 3-125
Biological Potential Yield

Land Classification	Acres	Annual Yield (MMBF Net)
Tentatively Suited	2,561,561	704
Unsuited-Withdrawn	6,997,441	569
Unsuited-Other	7,438,179	22
Total	**16,997,181**	**1,295**

Source: 1991 FORPLAN Data, Max Timber Benchmark (Appendix B)

Growth and Yield Methodology and Scientific Accuracy

Improved growth and yield techniques were needed for the Revision to allow managers to select optimum timber production practices while protecting resource values. In 1984, the Alaska Region requested that a variant of the Prognosis Growth and Yield Model be developed for the western hemlock-Sitka spruce forest type for Southeast Alaska. Prognosis is an individual tree, distance-independent growth and yield model and was developed for use in mixed species types of the Inland Empire (Washington and northern Idaho). Variants of the model have been calibrated for different geographic areas of the western United States (Stage, 1979).

Prognosis has the following characteristics (Davis and Johnson, 1987):

- It has the ability to initiate analysis with existing stands in almost any condition of size, stocking, species, and vigor.
- It requires input data for height, diameter, and crown size for sampled trees in the subject stand in addition to stand and environmental parameters.
- Although its growth equations are based on extensive sample data on tree growth within the geographic areas of application, the user can collect increment data from the subject stand and plug this new growth information into the model.
- It is stochastic (involving probability or chance) in that a random element is added to the growth of each tree based on the error distribution of the inventory data.

In 1987, the Southeast Alaska variant of Prognosis (SEAPROG) was developed by the Forest Service Mensuration and Systems Development Group in Ft. Collins, Colorado. Information was collected from many sources within the range of the western hemlock-Sitka spruce forest type, including the major portion of the Tongass National Forest, coastal British Columbia, the Queen Charlotte Islands, and the extreme northwestern tip of the Olympic Peninsula. Since Prognosis is an individual tree model, a wide variety of forest types can be accommodated, as can any stand structure ranging from even-aged to uneven-aged.

Although the model continues to be calibrated, it has been released to the Region and is being used to develop timber yield information for the Revision. (See Appendix H - Empirical Timber Yield Tables for a detailed listing of yield tables.)

Existing stands

The existing stand volume characteristics in Table 3-126 were developed using SEAPROG to summarize existing conditions. Forest inventory information continues to support the premise used in the 1979 Forest Plan that growth equals mortality for the aggregate of old-growth stands. For this reason, old-growth yields will remain constant over time in the Revision calculations.

Table 3-126

Tongass National Forest stand characteristics - Forest inventory

	Stand Characteristics for 9"+ tree						Percent Species Composition										
Strata	Trees Per Acre	Basal Area (sq ft/ac)	Quad Mean Diam[2] (inches)	Height Top Trees (feet)	% De-fect	Logs per MBF	Alaska Cedar	Sitka Spruce	Lodge-pole Pine	West. Red Cedar	West. Hem.	Mtn. Hem.	Hard-woods	Cubic Volume Per Ac	Volume Per Ac MBF[1]	Map Strata Acres	Standing Volume MMBF
Chatham Area																	
A	108	195	18.2	70	17	7	7.9	30.8	0.2	0.1	41.1	20.0	0.0	4.2	14.61	1,091,152	15,942
B	105	220	19.6	80	19	4	1.3	30.1	0.0	0.0	60.8	7.8	0.1	5.8	23.14	758,931	17,562
C	78	241	23.8	87	17	3	0.0	34.1	0.0	0.0	65.0	0.9	0.0	7.1	30.50	218,533	6,665
D	63	250	27	92	11	2	0.0	98.7	0.0	0.0	2.3	0.0	0.0	7.9	35.88	11,714	420
Total																**2,080,330**	**40,589**
Stikine Area																	
A	123	210	17.7	86	27	8	15.3	23.0	0.1	4.2	50.6	6.4	0.4	5.6	22.01	638,635	14,056
B	99	220	20.2	96	25	4	4.8	28.4	0.0	2.6	61.6	2.6	0.0	6.6	27.42	498,242	13,662
C	84	204	21.1	101	22	4	3.2	41.0	0.0	0.0	50.1	5.5	0.2	6.8	30.16	82,816	2,498
D	67	240	25.6	113	15	3	0.0	51.1	0.0	0.0	48.9	0.0	0.0	8.8	40.88	8,423	344
Total																**1,228,116**	**30,560**
Ketchikan Area																	
A	126	208	17.4	77	27	10	13.4	18.2	0.8	20.4	34.2	11.9	1.1	4.8	16.86	898,689	15,152
B	95	231	21.1	94	22	4	2.7	26.0	0.0	8.3	58.9	4.1	0.0	7.0	29.43	763,246	22,462
C	70	204	23.1	97	21	3	1.6	33.3	0.0	7.1	55.1	2.9	0.0	6.0	26.89	196,333	5,279
D	80	229	22.9	104	20	3	0.2	24.0	0.0	8.0	67.8	0.0	0.0	7.6	35.97	69,504	2,500
Total																**1,927,772**	**45,394**
															Total Strata A:	2,628,476	45,150
															Total Strata B:	2,020,419	53,686
															Total Strata C:	497,682	14,442
															Total Strata D:	89,641	3,265
															Forest Total:	**5,236,218**	**116,543**

[1] Bureau Long log Scale

[2] Diameter of average basal area (quadratic mean diameter)

Managed yields. A stand of trees which has regenerated after overmature timber has been harvested is categorized as a second-growth stand. The growth of these stands can be predicted by yield tables similar to old-growth stands. Second-growth yield tables for the Tongass Land Management Plan were adapted from published yield tables for young-growth hemlock-spruce stands in Southeast Alaska (Taylor, 1934). Although these tables were over 40 years old, they were the standard for predicting productivity of unmanaged young growth that follows harvesting of Southeast Alaska's overmature old-growth stands at the time.

Yield tables were also developed for managed young growth stands. Second-growth management applies precommercial thinning to young stands. Precommercial thinning (thinning stands usually less than 20 years old to improve species composition and accelerate the diameter growth of the trees that remain) was projected to increase the average tree diameters and increase the yield of merchantable wood by the time the trees had reached maturity at the end of the rotation (Ruth and Harris, 1979).

The Revision Empirical Yield Tables (included in Appendix H) were developed using the 1980's Forest Inventory data in the SEAPROG model. Output volumes were based on net live 32 foot log scale (board foot volume determination) for trees 9.0 inches and larger at their breast diameter (DBH). Yield tables were established for each of the three Administrative Areas. Volume outputs vary by area for the same treatment and site index. The reasons for the differences is explained by greater diameter growth taking place at lower latitudes, differences in species composition, and the way the model selects trees to thin or harvest when stand composition is not controlled.

Timber

Environmental Consequences

The Tongass National Forest has a wide range of timbered conditions. While about 60 percent of the land area is considered forested, less than 20 percent is classified as nonwilderness, productive timberland capable of being managed for industrial wood products. Timber harvest on these lands provides an important economic base for Southeast Alaska. Management of the timber resource can result in significant changes in the Forest ecosystem.

This section discusses the environmental consequences of the alternatives on timber production and harvest. The interrelationships between timber and other effects of alternatives are discussed here as well as in other resource sections of this chapter.

Assumptions Common to all Alternatives

Forest-wide standards and guidelines, and other standards and guidelines in each management prescription, will be applied to all alternatives. (See Proposed Revised Forest Plan, Chapters 3 and 4.) These standards and guidelines are designed to insure maintenance of resource values such as water quality, fisheries and wildlife habitat, soil productivity, cultural resources, visual quality and recreation.

All alternatives have a mix of even-aged and uneven-aged management (see Appendix G, Silvicultural Systems, for a description of the various systems). Even-aged management systems have been the primary historic means of timber harvest on the Tongass National Forest. Uneven-aged management is prescribed for areas with objectives for which even-aged timber harvest is less compatible (such as important scenic viewsheds and riparian areas). Opportunities for uneven-aged management as the primary silvicultural system are limited by road access and the need to employ aerial or cable harvest techniques almost exclusively. Single tree or small group selection is expensive and, in many cases, technically impractical. The final selection of the silvicultural system will be made during project implementation based on site characteristics and management objectives. All silvicultural methods of even-aged and uneven-aged management are available for site-specific project consideration in all management prescriptions that allow timber harvesting.

Summary of Effects

The effects on the timber resource were evaluated in terms of the timber supply (Allowable Sale Quantity), management intensity, and the long- and short-term sales programs. These consequences are summarized below and in Table 3-127.

- If utility volume is included, Alternatives B, C, D, and P would meet or exceed the projected demand for National Forest timber (400 MMBF). Alternative A would provide 89 percent of the projected demand.
- The capability to provide timber harvest direct employment varies from 3,075 jobs (Alternative A) to 4,925 jobs (Alternative D). From 1987 through 1990, the Tongass National Forest Timber Sale Program has provided from about 2,900 to 3,850 jobs (based on annual timber harvest including utility volume of 336 million board feet to 443 million board feet).
- The net decadal revenue (mid-market pond log value less costs) from the timber program is positive for all alternatives.

- Of the total available forest lands, the range allocated to management prescriptions that allow timber harvest varies from a low of 49 percent (1.26 million acres) in Alternative A to a high of 78 percent in Alternative D (1.99 million acres).
- The projected income from timber harvest varies from $119.9 million (Alternative A) to $190.6 million (Alternative D).
- All of the first-decade Allowable Sale Quantity (ASQ, sawlog) in Alternative A would be needed to satisfy the long-term contracts; Alternative B would need 82 percent of the ASQ; Alternative C, 69 percent; Alternative D, 66 percent; and Alternative P, 75 percent. Consequently, there would be no short-term program for Alternative A, and the Alternative B short-term program would be about 65 percent of the average short-term sell from 1980 through 1990. The short-term program in Alternatives C, D, and P exceed the historic sell (1980-1990).

Table 3-127

Summary of effects and alternative comparisons

Goals/Indicators	Alternatives A	B	C	D	P
Annual Allowable Sale Quantity (MMBF) (1st Decade)[1]	298	343	451	472	418
Annual Utility Volume (MMBF) (1st Decade)	57	70	90	96	84
Annual Capital Investment Needed ($, millions)	8	4	5	5	8
Volume Available for Independent Sales Program (MMBF):					
1st Decade	0	615	1,388	1,599	1,064
2nd Decade	1,625	1,910	3,282	3,456	2,944
Long-Term Sustained-Yield (Average annual MMCF)	106	121	153	159	143
Suitable-Available in Timber Harvest Prescriptions (M Acres)	1,261	1,457	1,940	1,989	1,848
Suitable-Scheduled Forest Lands (M Acres)	1,173	1,360	1,732	1,818	1,601
Suitable-Scheduled as a percent of Total Available for Timber Harvest	93	93	89	91	87
Suitable-Available as a percent of Total Tentatively Suitable (2.56 MM acres)	49	57	76	78	72
Even-age Management (Average Annual First Decade, Acres)	11,460	13,120	16,890	17,220	15,560
Timber Harvest Employment Capability (1st Decade, # of Jobs)	3,075	3,575	4,700	4,925	4,350
Predicted Timber Harvest Income (MM $)	119.9	138.3	181.8	190.6	169.3
Predicted Timber Sale Program Net Revenue First Decade (MM $)	4.1	4.3	4.1	5.2	4.3

Source: FORPLAN Analysis, June 1991.

[1] Includes lands to be conveyed to the State and Native Corporations.

Direct and Indirect Effects

Timber Supply

Tentatively suitable and available timber land. The ability of the Tongass National Forest to produce timber is dependent on the quantity and quality of lands allocated to timber production. The tentatively suitable acres were identified by applying the criteria described in the timber affected environment (see also Proposed Revised Forest Plan, Appendix A). As a result, there are 2,561,561 acres that are tentatively capable, available, and suitable for timber production: about 15 percent of the total land area on the Forest.

For clarification, the terminology used for lands associated with timber harvest in the alternatives is described here:

- Tongass National Forest - (16.9 million acres) - total area.
- Withdrawn - land that is not available for timber production because it is made unavailable by Congress, the Secretary of Agriculture, or the Chief of the Forest Service. This includes: Wilderness, National Monuments, Research Natural Areas, Experimental Forests, Enacted Municipal Watersheds, Land Use Designation II, and the stream buffers specified by the Tongass Timber Reform Act for Class I streams and Class II streams that flow directly into Class I streams.
- Forested lands - (10.0 million acres) - Total forested land including withdrawn and non-withdrawn, productive and non-productive are classified as forested land.
- Productive Forest Lands - (5.8 million acres) - The term Productive Forest Lands (PFL) is synonymous to the current plan's Commercial Forest Lands (CFL). It includes forested land with volume greater than 8 thousand board feet (MBF) per acre, both withdrawn and non-withdrawn).
- Tentatively Suitable Lands - (2,561,561 acres) - productive, non-withdrawn lands that can be considered for timber harvest.
- Available Lands - (1.2-1.9 million acres) - varies by Alternative. The portion of the Tentatively Suitable land area that is available to be considered for timber harvest in each alternative.
- Suitable-Scheduled lands - (1.2-1.8 million acres) - varies by Alternative. The portion of available lands scheduled for harvest in each alternative. The Allowable Sale Quantity for each alternative is based on the suitable-scheduled acres.
- Encumbered lands - (261,300 acres) - Lands that have been selected but not yet conveyed to the State of Alaska (174,000 acres), Native Corporations (75,300 acres), and Native allotments (12,000 acres).

Each alternative had the same potential tentatively suitable land area before allocation of the land use designations. Based on the alternative goals and objectives, the actual acres designated as available for harvest varies by alternative. The available timber land is that portion of the tentatively suitable land area which is analyzed for timber harvest activities. Alternative A, which emphasizes high-quality fish and wildlife habitat, Wilderness and unroaded areas, Wild and Scenic Rivers, scenic quality, and a wide range of recreational opportunities in a natural setting, is at the low end of the timber yield spectrum. Alternative D, which emphasizes market values particularly timber supply, is at the high end of the timber yield spectrum. This information is displayed in Table 3-128.

Table 3-128

Components of tentatively suitable Forest land by alternative (acres)

Alt.	Strata	Total Prod. Forest	Total Tent. Suitable	Available Suitable Acres: Total Avail Suitable	Old Growth	Young Growth	Management Intensity [1] Reg. Class 1 Clearcuts	Reg. Class 2 Clearcuts	Reg. Class 3 Stand Mtnc.	Operability [2] Normal	Difficult	Isolated
A	YG [1]	503,934	361,466	280,644	0	280,644	131,240	124,654	24,750	264,192	15,119	1,333
	A	2,652,116	1,026,010	440,506	432,985	7,521	183,047	232,015	25,444	302,395	106,920	31,191
	B	2,020,259	888,656	396,879	393,797	3,082	161,144	212,719	23,015	288,627	93,236	15,016
	C	497,684	229,949	110,428	108,127	2,301	45,812	51,438	13,177	89,553	18,989	1,886
	D	89,642	55,480	32,210	32,170	40	16,022	14,129	2,060	28,651	3,460	99
	Total	**5,763,635**	**2,561,561**	**1,260,667**	**967,079**	**293,588**	**537,265**	**634,955**	**88,446**	**973,418**	**237,724**	**49,525**
B	YG	503,934	361,466	292,922	0	292,922	187,787	81,563	23,572	275,827	15,765	1,330
	A	2,652,116	1,026,010	528,940	519,738	9,202	285,032	218,467	25,442	353,771	136,188	38,981
	B	2,020,259	888,656	464,964	460,600	4,364	255,198	184,589	25,177	333,842	112,494	18,628
	C	497,684	229,949	135,693	130,729	4,964	71,324	49,808	14,559	110,475	23,327	1,890
	D	89,642	55,480	34,113	34,073	40	23,128	8,826	2,160	30,513	3,481	119
	Total	**5,763,635**	**2,561,561**	**1,456,632**	**1,145,140**	**311,492**	**822,469**	**543,253**	**90,910**	**1,104,428**	**291,255**	**60,948**
C	YG	503,934	361,466	314,559	0	314,559	230,449	63,069	21,041	295,572	17,513	1,474
	A	2,652,116	1,026,010	43,534	730,133	13,401	497,804	218,898	26,835	486,432	191,359	65,743
	B	2,020,259	888,656	651,289	646,145	5,144	437,064	184,103	30,123	454,842	163,053	33,395
	C	497,684	229,949	183,498	178,174	5,324	120,366	50,531	12,599	144,482	35,848	3,168
	D	89,642	55,480	46,097	46,017	80	35,114	7,442	3,542	39,620	6,231	247
	Total	**5,763,635**	**2,561,561**	**1,938,977**	**1,600,469**	**338,508**	**1,320,797**	**524,043**	**94,140**	**1,420,948**	**414,004**	**104,027**
D	YG	503,934	361,466	336,389	0	336,389	274,402	40,451	21,536	316,784	17,968	1,637
	A	2,652,116	1,026,010	752,670	736,228	16,442	615,669	116,404	20,596	497,144	193,384	62,142
	B	2,020,259	888,656	674,847	669,104	5,743	548,138	102,829	23,880	478,586	163,445	32,816
	C	497,684	229,949	178,886	173,282	5,604	137,980	31,286	9,620	143,554	32,462	2,870
	D	89,642	55,480	46,636	46,536	100	41,137	2,937	2,562	40,757	5,660	219
	Total	**5,763,635**	**2,561,561**	**1,989,428**	**1,625,150**	**364,278**	**1,617,326**	**293,907**	**78,194**	**1,476,825**	**412,919**	**99,684**
P	YG	503,934	361,466	308,757	0	308,757	208,640	75,019	25,100	290,350	16,913	1,494
	A	2,652,116	1,026,010	702,635	689,994	12,641	442,956	226,592	33,087	459,740	181,971	60,924
	B	2,020,259	888,656	621,263	616,059	5,204	374,334	212,561	34,367	432,478	156,027	32,758
	C	497,684	229,949	171,559	166,416	5,143	102,430	52,828	16,302	135,627	33,024	2,908
	D	89,642	55,480	43,377	43,297	80	30,847	9,389	3,141	37,300	5,851	226
	Total	**5,763,635**	**2,561,561**	**1,847,591**	**1,515,766**	**331,825**	**1,159,207**	**576,389**	**111,997**	**1,355,495**	**393,786**	**98,310**

Source: Revision Database Q111D, 6/91

[1] Regulation Class 1 = Timber emphasis. Regulation Class 2 = Timber co-emphasis with other resources. Regulation Class 3 = Emphasis other than timber (incidental timber yields).

[2] Operability refers to timber harvest operability and is defined as the type of timber harvest methods generally necessary to move the trees from stump to landing. There are three different classes of operability: normal (tractor and highlead cable), difficult (long span skyline), and isolated (helicopter)

[3] YG = Currently Nonstocked or trees less than 9 inches DBH. Strata A = Volume classes 3 and 4. Strata B = Volume class 5. Strata C = Volume class 6. Strata D = Volume class 7.

Scheduled acres and the Allowable Sale Quantity (ASQ). The long-term sustained-yield capacity (LTSYC) for each alternative is a prediction of the maximum timber volume that can be sustained annually from the available tentatively suitable timber lands on the Forest, consistent with the multiple use objectives of each alternative. For all alternatives, the long-term sustained yield capacity is higher than the allowable sale quantity in the first several decades. This is due to greater yields per acre achieved in managed second-growth stands than in existing old-growth stands.

The differences in long-term sustained-yield capacities between each alternative reflect both:

- the number of acres available for timber management, and
- the intensity of timber management activities scheduled for those acres.

The Allowable Sale Quantity (ASQ) is based on the suitable-scheduled acres selected by the FORPLAN model for each alternative. The suitable-scheduled acres associated with the ASQ vary by alternative and range from 1,173,000 to 1,818,400 acres through full rotation. The suitable acres are selected from the available land base acres. Available acres considered for timber management activities are derived from the Scenic Viewshed, Modified Landscape, Timber Production, Stream and Lake Protection, and Fish Habitat and Water Quality Requirements land use designations. In all alternatives, the suitable acres available are not 100 percent utilized for timber management. Figure 3-38 compares the number of acres by alternative that are in the tentatively suitable land base, that are available for timber harvest considerations, and those acres scheduled by FORPLAN analysis. Alternative A schedules the fewest suitable acres producing an allowable sale quantity of 298 million board feet net sawlog in the first decade. Alternative D has the highest number of suitable acres scheduled with an ASQ of 472 million board feet net sawlog in the first decade. The 1979 Plan (Alternative C) originally scheduled 1.75 million acres, but reanalysis with current information indicates that Alternative C needs to schedule 1.73 million acres to achieve the 450 MMBF annual allowable sale quantity. The suitable acres available for the 1979 Plan were 2.3 million. As a result of the 1990 Tongass Timber Reform Act, the suitable acres available has declined to 1.94 million (Alternative C).

Allowable Sale Quantity and Encumbered Lands. As of February 1991, approximately 174,000 acres of National Forest land is yet to be conveyed to the State of Alaska; approximately 75,300 acres are yet to be conveyed to Native Corporations, and approximately 12,000 acres of Native Allotments are yet to be conveyed under the Alaska Natives Claims Settlement Act of 1971 and the Statehood Act. The following ASQ reductions will likely result once all land conveyence is complete: Alternative A, eight percent; Alternatives B, D and P, seven percent; and Alternative C, five percent. Most of the remaining conveyance will occur in the 1990's. ASQ reductions can be expected by the turn of the century.

Components of the ASQ. The allowable sale quantity is comprised of volume from all strata, operability classes, and regulation classes.

Operability refers to timber harvest operability; it is defined as the type of timber harvest methods generally necessary to move the trees from stump to landing. There are three different classes of operability: Normal (tractor and highlead cable); Difficult (longspan skyline); and Isolated (helicopter). Normal operability classes have the lowest logging costs and Isolated stands of timber have the highest logging costs due to the amount of helicopter logging required. Logging costs vary by Area and timber volume class: highlead cable costs (stump to truck, 1985 dollars) can vary from $94-$178 per thousand board feet, long span skyline costs can vary from $92-$222 per thousand board feet, and helicopter costs can vary from $229-$446 per thousand board feet.

Regulation Class refers to timber management intensity; it is divided into four categories: Regulation Classes 0, 1, 2, and 3. Regulation Class 0 precludes timber harvest; Regulation Class 1 is where timber management is the primary emphasis; Regulation Class 2 is where timber has a co-emphasis with other resources; and Regulation Class 3 is where the primary emphasis is other than timber (incidental timber yields).

Over the planning period (16 decades), approximately 12 percent of the ASQ for Alternative A is contributed by Volume class 4-Difficult and all the Isolated, 13 percent for Alternative B, Alternative C - 14 percent, Alternative D - 14 percent and Alternative P - 15 percent. Table 3-129 displays the first five decades average annual ASQ by operability class, strata, and regulation class.

Over the first 5 decades, approximately 20 percent of the allowable sale quantity in Alternative A is scheduled (FORPLAN Model) to come from the difficult and isolated operability classes; Alternative B is 16 percent, Alternative C - 18 percent, Alternative D - 18 percent, and Alternative P - 19 percent.

Table 3-129

FORPLAN average Allowable Sale Quantity schedule, by operability class[1] and strata[2], by alternative, for decades 1 - 5 (net sawlog, MMBF)

		Regulation Class 1			Regulation Class 2			Regulation Class 3	Average Total for
Alt.	Strata	Normal	Difficult	Isolated	Normal	Difficult	Isolated	All Op. Classes	Decades 1-5
A	A	36	7	5	19	12	4		
	B	91	3	2	45	8	4		
	C	30	1	0	15	0	1		
	D	6	0	0	0	0	0		
	Total	**163**	**11**	**7**	**81**	**20**	**9**	**less than 1**	**290**
B	A	49	10	4	15	10	7		
	B	115	5	3	38	8	5		
	C	36	1	1	16	1	0		
	D	6	0	0	0	0	0		
	Total	**206**	**16**	**8**	**71**	**19**	**12**	**less than 1**	**332**
C	A	57	16	9	18	13	6		
	B	114	13	3	88	11	5		
	C	41	1	0	28	1	0		
	D	11	0	0	0	0	0		
	Total	**223**	**30**	**12**	**136**	**25**	**11**	**less than 1**	**437**
D	A	49	19	9	26	15	5		
	B	152	8	7	59	10	5		
	C	50	3	0	21	1	1		
	D	10	0	0	3	0	0		
	Total	**261**	**30**	**16**	**109**	**26**	**11**	**less than 1**	**455**
P	A	43	13	8	20	11	5		
	B	119	11	3	71	18	5		
	C	39	1	0	22	3	1		
	D	10	0	0	2	0	0		
	Total	**211**	**25**	**11**	**115**	**32**	**11**	**less than 1**	**405**

Source: FORPLAN Analysis Reports 7/91 Reports A-D,P_PLNT_MBF

[1] Operability Classes: Normal = Highlead logging; Difficult = Longspan logging; Isolated = Helicopter logging

[2] Strata A = Volume classes 3 and 4; Strata B = Volume class 5; Strata C = Volume class 6; Strata D = Volume class 7

ASQ and Projected Demand. Studies completed by the USDA-Forest Service (Haynes and Brooks, 1990) indicate that harvest from the Tongass National Forest necessary for total supply to meet expected demand will remain roughly constant at about 400 million board feet per year from 1990 to 2010. The projected demand of 400 million is comprised of approximately 193 million board feet of sawlogs, 25 of export logs, and 180 of pulp logs. Including utility volume, Alternatives B, C, D, and P would meet or exceed the projected demand for National Forest Timber. Alternative A provides 89 percent of the projected demand.

ASQ and Market Price. The ability of the Forest to provide an economic offering to a prospective bidder is also heavily influenced by the market. A $20/MBF change in log value at the mill can mean as much as 100 MMBF difference in economic timber available. See Appendix B for further discussion on economic supply and its relationship to log value at the mill.

Capital Investment. The annual capital investment (at mid-market values) needed to provide the scheduled volume is $8 million for Alternative A; $4 million for Alternative B; $5 million for Alternative C; $5 million for Alternative D; and $8 million for Alternative P.

Figure 3-38

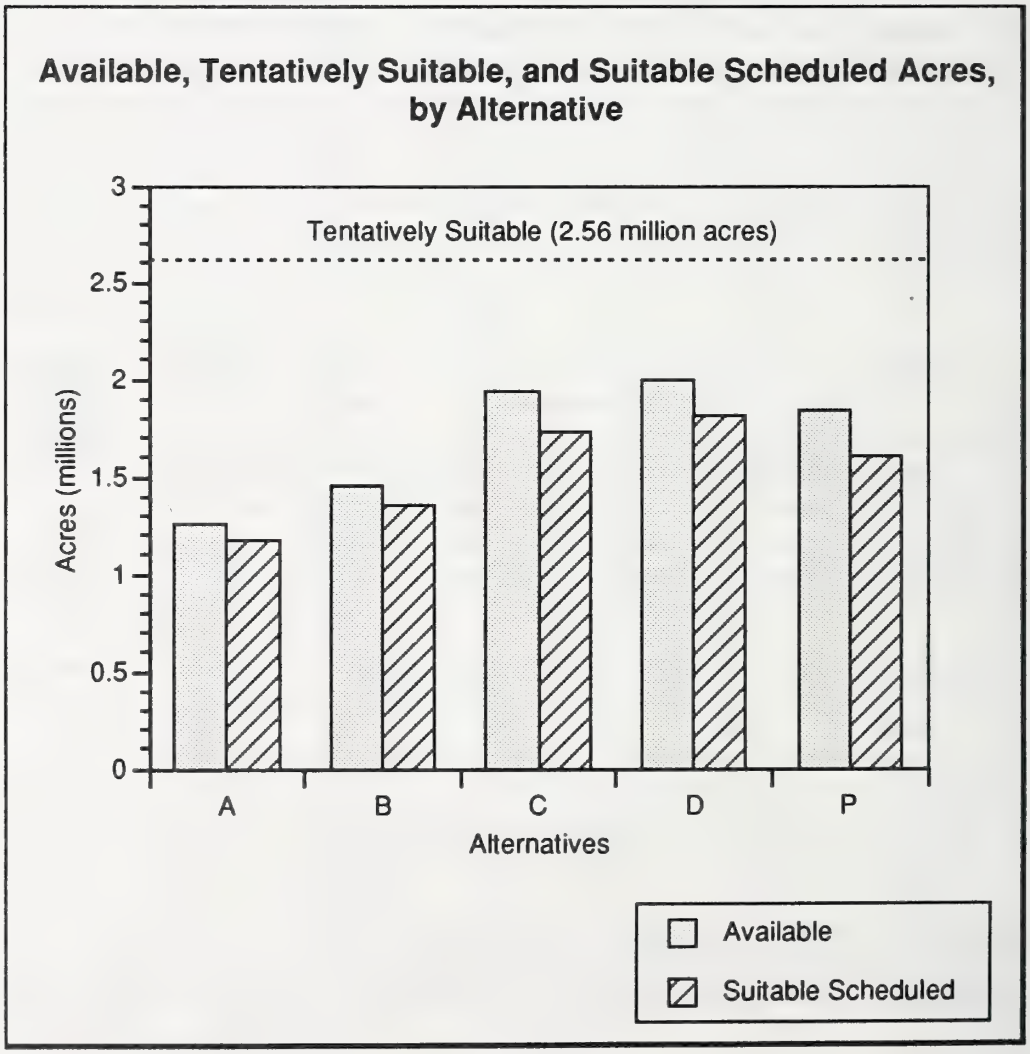


Table 3-130 displays Average Annual Allowable Sale Quantity (ASQ) both in cubic and board foot measure, Long-Term Sustained Yield (LTSYC) in cubic foot measure, and the acres to achieve each Alternative's ASQ.

The ASQ in board feet (MMBF) increases significantly starting about the eighth decade in all alternatives. This is due to second-growth stands entering the harvest schedule. Permanent growth plots in existing second growth stands indicate that managed second growth stands will yield volumes two to three times more than than existing old-growth stands.

Table 3-130

Average annual Allowable Sale Quantity (ASQ) and Long-term sustained-yield capacity (LTSYC) by alternative

Alt	Unit of Measure	Period 1	Administrative Area Portion of Period 1 ASQ Chatham	Stikine	Ketchikan	Period 2	Period 1-5	Period 6-9	Period 10	LTSYC
A	MMCF[1]	72	11	26	35	72	72	72	101	106
A	MMBF[2]	298	44	107	147	305	290	311	503	
A	Acres	11,464	1,872	3,986	5,606	11,353	11,945	9,731	8003	
B	MMCF	82	15	29	38	82	82	82	116	121
B	MMBF	343	59	122	162	348	334	355	573	
B	Acres	13,119	2,451	4,589	6,079	12,925	13,756	11,450	8,819	
C	MMCF	108	19	34	54	108	108	108	137	153
C	MMBF	451	77	143	231	455	437	461	676	
C	Acres	16,900	3,181	5,333	8,386	17,546	17,954	15,281	10,933	
D	MMCF	112	20	38	54	112	112	112	141	159
D	MMBF	472	80	159	233	472	455	477	697	
D	Acres	17,235	3,169	5,920	8,146	18,217	18,654	16,158	11,623	
P	MMCF	99	17	32	50	100	100	100	128	143
P	MMBF	418	70	134	214	421	406	428	633	
P	Acres	15,568	2,978	4,971	7,619	16,365	16,523	14,090	10,167	

Source. TLMP Revision FORPLAN Reports, June 1991

[1] MMCF=Million cubic feet

[2] MMBF=Million board feet

Timber Management Intensity

The intensity of management for an alternative refers to the mix of land use designations available for timber harvest and the silvicultural treatments applied to the acres which are suited for timber harvest activities. Management intensity fits into four basic categories for timber production:

Regulation Class 0. Land use designations that preclude timber production are classified as Regulation Class 0. Land use designations that preclude timber harvest include Wilderness, Wilderness National Monument, Non-wilderness National Monument, Research Natural Areas, Special Interest Areas, Other Areas, Primitive Recreation, Enacted Municipal Watersheds, Old-Growth Habitat, Semi-primitive Recreation, Experimental Forest, Land Use Designation II and Wild Rivers. Land allocated to these land use designations is considered unsuitable for timber production.

Regulation Class 1. Suitable acres where timber management is a primary resource objective. Land which is part of the suitable land area on which crops of industrial wood can be grown and harvested with adequate protection of other forest resources provided by the usual provisions of the timber sale contract. This land is available for and allocated to intensive timber management practices. This implies that intensive management practices are not constrained by access, and that environmental, esthetic, and other land values would not be unacceptably degraded by intensive management. The use of even-aged silviculture is emphasized with clearcuts generally limited to 100 acres or less. These lands would normally mean more acres in clearcut harvest systems, larger harvest units, and greater disturbance levels (up to 50 percent) than other management prescriptions that allow timber harvest. There may be more intensive precommercial thinning and other vegetative practices, including release of understory stands, and reforestation of specific species of seedlings to improve stand composition. Adjacent stands may be harvested when the existing stand is restocked and five feet in height.

Regulation Class 2. Timber is co-emphasized with other resources. Regulation Class 2 lands are suitable for timber production provided that the silvicultural systems are compatible with the multiple-use objectives. Silvicultural prescriptions may consist of conventional even-aged regimes with longer rotations and/or smaller unit sizes, uneven-aged management regimes, and specialized silvicultural prescriptions. Clearcut units are generally a smaller size (5-60 acres), depending on the landscape setting. Cumulative watershed disturbance is limited to no greater than 8-25 percent. Adjacent stands may be harvested when the existing stand is 15 to 35 percent of the height of the adjacent mature stand, which typically takes 20 to 30 years. Because of the requirement for co-emphasis, these lands will probably be the most intensively managed acres because of the extra need for coordination and extra constraints.

Regulation Class 3. Suitable acres where the primary emphasis is other than timber production (Incidental Timber Yields) are classified as Regulation Class 3. These lands will be managed primarily for maintenance and enhancement of resource values other than timber. Generally, any management of the timber resource on these lands will be for stand maintenance purposes only and will approach an uneven-aged silvicultural system. Production of high current or future timber yields is not a consideration. The typical cutting method and unit size is single tree or group selection (less than two acres). Under this management regime or concept, individual trees or small groups of trees are generally removed if conditions indicate a disease or pest threat to the stand, imminent mortality, severe decline in growth, or trees in cable yarding corridors. Land Use Designations that include this emphasis are: Scenic Viewsheds; Stream and Lake Protection; and Fish Habitat and Water Quality Requirements.

Indicators of management intensity for each alternative are the relative amount of land in the various regulation classes, silvicultural systems, and land use designations. A description of the management prescription for each LUD can be found in the Proposed Revised Forest Plan, Chapter 3. Management intensity by regulation class is displayed for each alternative in Table 3-131 and Figure 3-39.

Table 3 - 131

Available Suitable Acres by Alternative, Regulation Class, and Land Use Designation

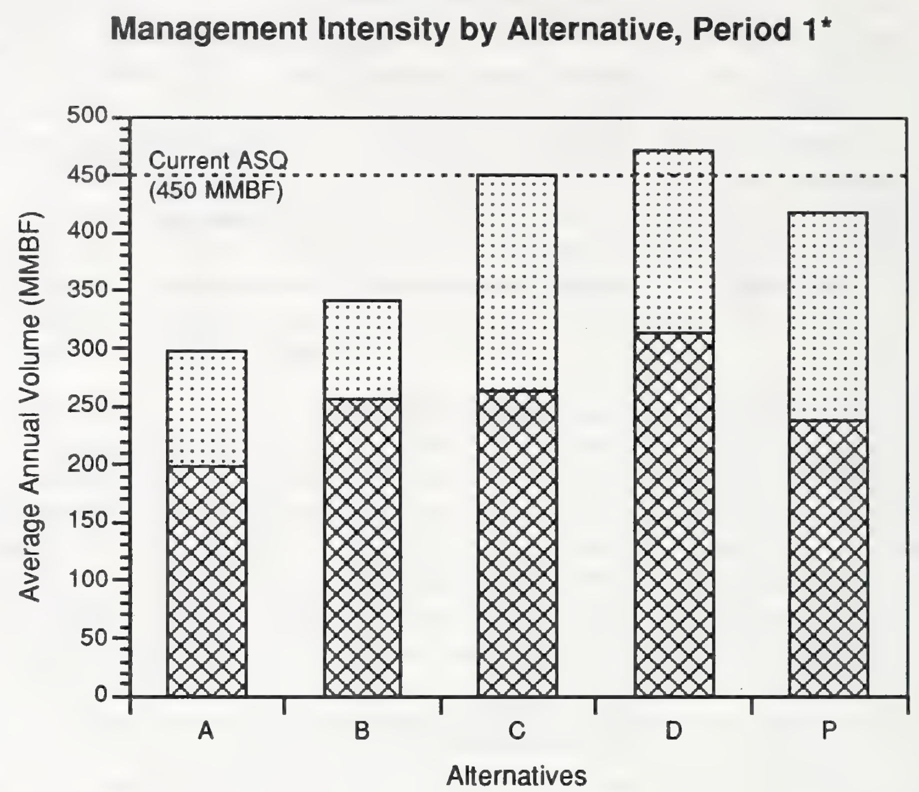
Land Use Designation	Regulation Class	Alternatives A	B	C	D	P
Timber Production (TM)	1	346,809	719,701	1,125,823	1,512,112	887,706
	2	120	5,016	50,968	93,567	31,249
	Total	**346,929**	**724,717**	**1,176791**	**1,605,679**	**918,955**
Modified Landscape (ML)	1	173,010	74,715	162,707	42,414	195,372
	2	250,829	127,721	216,735	144,345	250,872
	Total	**423,839**	**202,436**	**379,442**	**186,759**	**446,244**
Scenic Viewshed (SV)	1	17,447	28,053	32,267	2,159	76,129
	2	323,289	346,778	184,496	47,653	221,566
	3	56,692	49,610	35,283	15,297	52,352
	Total	**397,428**	**424,441**	**252,046**	**65,109**	**350,047**
Stream and Lake	2	46,573	54,321	71,843	-	67,347
Protection (SL)[1]	3	31,395	40,779	58,856	-	59,465
	Total	**77,968**	**95,100**	**130,699**	**-**	**126,812**
Fish Habitat and	1	-	-	-	60,641	-
Water Quality (WQ)[2]	2	-	-	-	5,782	-
	3	-	-	-	62,897	-
	Total	**-**	**-**	**-**	**129,320**	**-**
Scenic Rivers (SR)	2	2,596	3,018	-	-	861
	3	359	520	-	-	181
	Total	**2,955**	**3,538**	**-**	**-**	**1,042**
Recreation Rivers (RR)	2	11,546	6,399	-	2,559	4,494
	Total	**11,546**	**6,399**	**-**	**2,559**	**4,494**
Total Available Acres		**1,260,665**	**1,456,631**	**1,938,978**	**1,989,426**	**1,847,594**

Source: GIS Revision Data base, Q1040, June 1991

[1] A maintain and improve prescription

[2] A no serious and adverse effects prescription.

Figure 3-39



* Regulation Class 3 volume is less than one million board feet in all alternatives. See Table 3-129.

Source: FORPLAN Analysis, Alternatives A-D, P, 6/91 Revision Database, 6/91

The silvicultural treatments used in the alternatives include clearcut, group selection, individual tree selection, reforestation, release and precommercial thinning. The difference between each alternative is the number of acres to which these treatments are likely to be applied. Table 3-132 displays scheduled ouputs by management practice and management intensity.

Commercial thinning, for timber production, is not considered a viable treatment for programmatic planning purposes since it has not been demonstrated to be an economic resource management option of the forest types in Southeast Alaska. This type of management may be beneficial for other resource concerns and could be used to produce a desired vegetative characteristic should the need be recognized during site-specific project planning.

Table 3-132

Timber management scheduled outputs by alternative and management intensity (annual averages for the first decade)

Management Practice	A MMBF	A Acres	B MMBF	B Acres	C MMBF	C Acres	D MMBF	D Acres	P MMBF	P Acres
Clearcutting										
Reg. Class 1	198.1	7,530	256.4	9,870	262.4	9,990	313.8	11,420	238.4	8,960
Reg. Class 2	99.6	3,930	85.8	3,250	187.8	6,900	157.7	5,800	179.5	6,600
Total	**297.6**	**11,460**	**342.2**	**13,120**	**450.2**	**16,890**	**471.5**	**17,220**	**417.9**	**15,560**
Stand Maintenance										
Reg. Class 3	.4	400	.9	1,900	.7	700	.7	1,600	.3	300
Total	**298.1**		**343.1**		**450.9**		**472.2**		**418.2**	

Source: Forplan Analysis 6/91

Long-Term Sales

The long-term timber sales on the Tongass National Forest in operation today are the Alaska Pulp Corporation (APC) Contract with a pulpmill in Sitka, and the Ketchikan Pulp Company (KPC) Contract with a pulpmill in Ketchikan. The APC contract is scheduled to be completed in the year 2011; the Tongass National Forest is contractually obligated to provide approximately 2,458 million board feet of sawlog and utility volume over the remaining life of the contract. The KPC contract is scheduled to be completed in the year 2004; the Tongass National Forest is contractually obligated to provide approximately 2,443 million board feet of sawlog and utility log volume (historically 169 MMBF sawlog and 23 MMBF utility annually) over the remaining life of the contract (Timber Management Contract Files, Regional Office, October 1990).

Prior to the award of the Long-term Contracts, the Tongass National Forest was subdivided into eight allotment areas (labeled A through H). The criteria for allotment areas included having a ready supply of raw material and being in the vicinity of a potential pulpmill and power site.

The primary sale areas (see Long-Term Contracts map in the map packet) are the initial operating or cutting area boundaries of the long-term sales. The contracts provide for additional offering areas (Contract provision B0.31, KPC; and Contract Provision BO.3, APC) in other allotments if the volume is not available within the initial operating or cutting areas.

The APC sale area is comprised of Allotments B and H, the Contigency Area in Allotment C, and Allotment A-1. Timber harvest is confined to Allotments B and H unless the quantity of timber available for cutting is less than the contractual obligations. To meet contractual obligations, additional Offering Areas are permitted in Allotment C Contingency and Allotment A-1.

The KPC sale area is comprised of portions of Allotments E, F, and G. To meet contractual obligations, additional Offering Areas are permitted in the remaining portions of Allotments E, F, and G.

There is sufficient volume in all alternatives to meet the remaining contractual obligations of the long-term sales. However, there is a projected need to go outside the current operating areas to other existing allotments. Table 3-133 displays FORPLAN scheduled volume (net sawlog and utility) by Allotment Area. The allowable sale quantity (chargeable net sawlog volume) and the pulplog volume (non-chargeable utility volume) for the long-term and short-term sale programs is displayed in Table 3-135, Long Term and Short Term Program Volume Schedule. Since both long-term contracts are scheduled to be completed within two decades, only periods one and two are displayed.

Table 3-133

FORPLAN scheduled volume (MMBF) by Allotment Area for decades 1 and 2. (Total column includes estimated utility volume)

	Alternative A				Alternative B				Alternative C				Alternative D				Alternative P			
	Decade 1		Decade 2		Decade 1		Decade 2		Decade 1		Decade 2		Decade 1		Decade 2		Decade 1		Decade	
Allot-ment	Sawlog	Total	Sawlog	Total	Sawlog	Total	Sawlog	Total	Sawlog	Total	Sawlog	Total	Sawlog	Total	Sawlog	Total	Sawlog	Total	Sawlog	Total
B,H,A1	39	44	17	19	49	56	32	36	66	75	66	75	51	58	50	57	55	63	55	63
A	4	5	17	19	8	9	21	24	1	1	5	6	29	33	23	26	2	2	2	2
C Cont.	27	31	48	55	30	34	34	39	53	60	27	31	62	70	29	33	54	61	27	31
C	34	39	24	27	31	35	37	42	42	48	43	49	33	38	48	55	46	52	53	60
E,F,G	147	186	153	194	162	205	168	213	231	292	238	301	233	295	235	297	214	271	219	277
D	47	53	44	50	61	69	55	63	58	66	75	85	65	74	87	99	47	53	65	74
Total	**298**	**358**	**303**	**364**	**341**	**408**	**347**	**416**	**451**	**542**	**454**	**547**	**473**	**568**	**472**	**567**	**418**	**503**	**421**	**507**

Source: FORPLAN Analysis Reports A-D,P_Sale_don

Depending on the Alternative, volume from Allotments A, C, and D is projected to be offerred to satisfy the contractual obligations. All the first-decade ASQ (sawlog) in Alternative A would be needed to satisfy the long-term contracts; Alternative B would need 82 percent of the ASQ; Alternative C - 69 percent; Alternative D - 66 percent; and Alternative P - 75 percent.

Offerings for both long-term sales are anticipated from outside of the current operating areas in Alternative A. In Alternative A, all of "D" Allotment would likely have offerings scheduled for KPC. Allotment "D" includes all of the Stikine Administrative Area south and east of Mitkof Island and Kupreanof Island (Wrangell Ranger District). Alternatives B, C, D, and P are projected to have offerings for KPC on Cleveland Peninsula and the northern half of Revillagigedo Island.

Offerings for the APC contract are anticipated from other existing allotments in Alternatives A, B, C, D, and P. Additional Offering Areas would probably be needed from Allotments A and C for all alternatives.

The amount of timber volume available for the long-term contracts depends on the land base available for timber harvesting, implementation requirements, and management requirements. Scheduling volume available to meet long-term sale obligations was performed using the FORPLAN model and local field knowledge. Constraints used in the FORPLAN model control the rate of change and quantity of timber volume harvested from decade to decade, by management area, and by alternative. Constraints or limits placed on the FORPLAN model are sets of conditions that represent management requirements, minimum implementation requirements, specific land allocations, and output schedules. Specific conditions for this

analysis include: 1) no below-cost timber program for each decade; 2) meet the long-term contract volume commitments; 3) proportionality - limit the volume harvested in volume classes 6 and 7 combined so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the long-term contract management areas (Tongass Timber Reform Act Sec 301(c)(2); and 4) ensure a mix of harvest from all volume classes.

With the passage of the Tongass Timber Reform Act, the acreage that was suitable for timber harvest was reduced. The act designated new Wilderness areas, permanent LUD II's, and minimum 100 foot stream buffers on each side of Class II streams that flow directly into Class I streams and all Class I streams. Many of these areas contain acres which were also in the current (1979) Plan's timber base. Commercial timber harvest will no longer be allowed within these areas. As a result of the Tongass Timber Reform Act, there was a reduction in the tentatively suitable landbase of 138,000 acres in APC Allotments B, H, C Contingency, and A-1; and 180,000 acres in KPC Allotments E, F, and G (80,000 acres on the Primary Sale Area and 100,000 on the remaining portions of the Allotments E, F, and G). Table 3-134 displays the tentatively suitable land base before and after TTRA by Allotment area and the suitable available acres for timber harvest; the suitable available acres are dependent on the acres assigned to prescriptions that allow consideration of timber harvest in each.

Table 3-134

Suitable available acres and volume class acres by long-term sale allotment area

Allotment Area Long-Term Sales	Tentatively Suitable Prior To TTRA Acres	Tentatively Suitable After TTRA Acres	Suitable Available After TTRA Acres	Contri-bution to ASQ Net Sawlog MMBF)[1]	Old Growth Standing Volume MMBF	Old Growth Acres	Second Growth Acres	Volume Class 4 Acres	Volume Class 5 Acres	Volume Class 6 Acres	Volume Class 7 Acres)
Alternative A											
B	132,367	102,979	64,052	15	1,234	51,016	13,036	30,917	19,058	1,041	0
H	123,429	110,797	30,724	7	531	22,555	8,169	16,346	5,888	281	40
C-Contingency	212,120	174,044	92,291	22	1,995	73,197	19,094	19,722	37,294	12,180	4,202
A-1	244,064	186,100	72,935	17	1,124	57,623	15,312	31,869	22,957	3,956	180
Rest of A	351,007	265,235	75,154	18	1,460	71,094	4,060	31,768	27,755	11,531	40
Rest of C	392,264	349,062	165,677	39	3,401	137,075	28,602	75,321	52,081	9,879	434
E-Primary	199,130	184,616	141,194	34	2,098	85,155	56,039	31,847	34,402	15,165	3,920
F-Primary	55,982	53,700	38,960	9	698	27,664	11,296	9,596	16,165	2,163	60
G-Primary	217,865	154,325	101,493	24	1,499	59,208	42,285	19,631	24,211	11,608	3,978
Rest of E	84,165	79,147	39,166	9	826	34,347	4,819	14,553	15,095	3,939	840
Rest of F	404,886	370,836	129,743	31	2,891	116,038	13,705	44,797	49,942	12,469	9,191
Rest of G	338,364	276,274	157,426	37	2,806	112,132	45,294	41,332	42,919	19,236	9,146
D	301,384	254,446	143,500	34	2,930	117,924	25,576	66,791	45,832	6,500	180
Total	**3,057,027**	**2,561,561**	**1,252,315**	**298**							
Alternative B											
B	132,367	102,979	69,963	16	1,373	56,247	13,716	34,651	20,855	1,280	0
H	123,429	110,797	30,843	7	532	22,515	8,328	16,545	5,768	281	40
C-Contingency	212,120	174,044	107,364	25	2,349	88,170	19,194	30,307	41,455	12,426	4,182
A-1	244,064	186,100	107,597	25	1,766	88,704	18,893	45,214	36,208	8,561	180
Rest of A	351,007	265,235	95,104	22	1,928	79,717	15,387	36,769	33,036	20,418	100
Rest of C	392,264	349,062	226,909	52	4,880	197,647	29,262	111,095	74,198	12,620	494
E-Primary	199,130	184,616	154,484	36	2,408	97,086	57,398	35,283	40,223	17,082	4,739
F-Primary	55,982	53,700	42,193	10	793	31,158	11,035	10,194	18,762	2,442	80
G-Primary	217,865	154,325	122,586	28	1,868	73,579	49,007	23,679	31,367	14,194	4,560
Rest of E	84,165	79,147	45,926	11	984	40,848	5,078	16,933	17,655	5,379	960
Rest of F	404,886	370,836	147,347	34	3,291	133,281	14,066	53,000	56,481	14,750	9,412
Rest of G	338,364	276,274	153,245	35	2,678	108,090	45,155	42,006	38,563	18,797	9,167
D	301,384	254,446	148,056	34	3,079	123,782	24,274	69,089	48,712	7,161	180
Total	**3,057,027**	**2,561,561**	**1,451,617**	**334**							
Alternative C Current Plan (includes TTRA)											
B	132,367	102,979	80,897	19	1,607	65,701	15,196	39,987	24,933	1,420	0
H	123,429	110,797	71,675	17	1,470	62,005	9,670	44,563	16,980	722	40
C-Contingency	212,120	174,044	124,020	29	2,772	104,445	19,575	37,051	48,649	14,644	4,423
A-1	244,064	186,100	134,266	31	2,270	113,713	20,553	58,999	45,229	11,463	340
Rest of A	351,007	265,235	151,352	35	1,459	66,332	8,821	31,768	27,755	11,531	40
Rest of C	392,264	349,062	282,884	66	6,275	252,182	30,702	133,963	98,898	19,307	795
E-Primary	199,130	184,616	169,584	39	2,772	111,188	58,396	39,384	46,843	19,742	5,539
F-Primary	55,982	53,700	47,769	11	915	36,232	11,537	12,340	21,550	2,603	80
G-Primary	217,865	154,325	139,423	32	2,223	87,934	51,490	28,903	37,932	16,458	4,920
Rest of E	84,165	79,147	75,551	18	1,702	69,973	5,578	27,845	31,489	8,939	1,840
Rest of F	404,886	370,836	234,232	54	5,367	216,267	17,965	87,978	90,132	24,719	15,757
Rest of G	338,364	276,274	227,707	53	4,407	180,038	47,669	73,205	67,846	28,044	11,744
D	301,384	254,446	197,300	46	4,050	162,848	30,910	91,463	63,463	9,582	200
Total	**3,057,027**	**2,561,561**	**1,936,660**	**449**							

Table 3-134 (continued)

Allotment Area Long-Term Sales	Tentatively Suitable Prior To TTRA Acres	Tentatively Suitable After TTRA Acres	Suitable Available After TTRA Acres	Contri-bution to ASQ Net Sawlog MMBF)[1]	Old Growth Standing Volume MMBF	Old Growth Acres	Second Growth Acres	Volume Class 4 Acres	Volume Class 5 Acres	Volume Class 6 Acres	Volume Class 7 Acres)
Alternative D											
B	132,367	102,979	93,178	23	1,837	74,402	18,776	43,329	30,513	1,540	0
H	123,429	110,797	59,476	15	1,224	51,612	7,864	37,050	14,140	622	40
C-Contingency	212,120	174,044	132,766	33	2,963	111,332	21,434	37,961	54,845	14,948	4,223
A-1	244,064	186,100	150,007	38	2,517	126,015	23,992	64,607	51,826	11,701	480
Rest of A	351,007	265,235	123,020	31	2,470	105,655	17,365	49,233	45,413	22,794	120
Rest of C	392,264	349,062	252,388	63	5,394	217,816	34,572	120,254	83,828	14,161	534
E-Primary	199,130	184,616	179,257	45	2,931	117,127	62,130	41,024	49,903	20,720	5,939
F-Primary	55,982	53,700	49,889	12	939	36,991	12,898	12,159	22,450	2,623	80
G-Primary	217,865	154,325	145,925	36	2,356	92,932	52,993	30,368	41,242	16,322	5,321
Rest of E	84,165	79,147	47,065	12	1,010	41,866	5,199	17,392	18,095	5,239	1,220
Rest of F	404,886	370,836	213,401	53	4,853	195,872	17,529	77,268	81,576	21,953	15,555
Rest of G	338,364	276,274	240,790	60	4,676	189,919	50,871	75,330	73,319	30,427	11,964
D	301,384	254,446	201,949	50	4,166	167,448	34,501	95,036	65,492	8,962	200
Total	**3,057,027**	**2,561,561**	**1,889,111**	**472**							
Alternative P											
B	132,367	102,979	76,871	18	1,516	62,016	14,855	38,045	23,231	1,380	0
H	123,429	110,797	50,581	12	1,016	42,913	7,668	31,242	11,470	401	40
C-Contingency	212,120	174,044	91,047	21	1,981	72,753	18,294	19,421	37,970	11,441	4,102
A-1	244,064	186,100	154,647	36	2,588	131,936	22,711	71,689	50,644	11,621	400
Rest of A	351,007	265,235	150,392	35	2,958	130,186	20,206	61,993	54,743	25,275	400
Rest of C	392,264	349,062	276,763	64	6,153	247,142	29,621	130,743	97,358	19,027	795
E-Primary	199,130	184,616	161,578	37	2,586	104,223	57,355	37,903	43,300	18,281	5,039
F-Primary	55,982	53,700	45,262	10	859	33,926	11,336	11,397	20,246	2,523	80
G-Primary	217,865	154,325	135,737	31	1,401	85,169	50,568	36,630	15,697	4,860	5,321
Rest of E	84,165	79,147	65,954	15	1,462	60,536	5,418	24,906	27,631	6,859	1,260
Rest of F	404,886	370,836	217,768	50	4,981	202,041	15,727	80,799	83,729	23,038	14,877
Rest of G	338,364	276,274	199,856	46	3,809	152,983	46,873	57,655	59,909	24,934	11,225
D	301,384	254,446	187,413	43	3,956	157,321	30,092	88,439	61,220	9,262	1,260
Total	**3,057,027**	**2,561,561**	**1,813,869**	**418**							

Source: GIS Revision Data base Q1050c4 and Q1050c1

[1] Volume contributed over the planning horizon

Timber policy constraints, such as dispersion, will affect the availability of timber for harvest; volume scheduled from Regulation Class 1 land is constrained to no more than 50 percent of a watershed harvested every 30 years and volume scheduled from Regulation Class 2 is constrained to no more than 8 to 25 percent of a watershed harvested in a management area every 30 years.

The modeling and analysis process is described in detail in Appendix B.

Short-term Timber Sales

Short-term timber sale contracts account for nearly one-third of the volume offered on the Tongass. Between 1980-1990, nearly 120 million board feet per year was offered for independent short-term sales. About 95 million board feet of the 120 million board feet offered was specified for Small Business Administration (SBA) qualified operators (set-aside sales).

Short-term timber sale contracts generally occur outside the long-term timber sale contract boundaries. Under the existing long-term contracts, any offer of timber within the sale area must first be made to the long-term contract holders. Then, if rejected, it may be offered as short-term sales.

As a consequence of meeting the long-term volume contractual obligations, the effects on the availability of timber to purchasers of short-term sales in the first decade are as follows: 1) there is essentially no short-term program in Alternative A, but there may be some volume available if offerings are rejected by the long-term contract holders; 2) Alternative B's short-term annual program of 62 million board feet is well below the 11 year average of 120 million board feet offered to industry; 3) Alternatives C and D exceed the historic average; and 4) Alternative P is within 12 percent of historic offer, but exceeds the historic sell of 94 million board feet (1980-1990).

Alternatives that do not supply sufficient volume to maintain the short-term contracts, have the potential of affecting the short-term (independent) timber sale program and Small Business Set Aside Program. Lack of timber supply could affect in the existing mill infrastructure and employment (refer to Chapter 3, Environmental Consequences, Economics).

Table 3-135 displays the volumes scheduled for both long-term and short-term sales programs.

Table 3-135

Long-term and Short-term Sales Program volume schedule (total volume for the decade)

		Period 1		Period 2		
Alt	Contract	Sawlog MMBF	Utility MMBF	Sawlog MMBF	Utility MMBF	Total MMBF
A	APC	1,037	276	905	241	2,459
A	KPC	1,944	265	499	68	2,776
A	Short-Term	0	0	1,625	298	1,923
	Total	**2,981**	**541**	**3,029**	**607**	**7,158**
B	APC	1,193	317	749	199	2,458
B	KPC	1,623	221	820	112	2,776
B	Short-Term	615	163	1,910	396	3,084
	Total	**3,431**	**701**	**3,479**	**707**	**8,318**
C	APC	1,238	329	704	187	2,458
C	KPC	1,883	257	560	77	2,777
C	Short-Term	1,388	314	3,282	622	5,606
	Total	**4,509**	**900**	**4,546**	**886**	**10,841**
D	APC	1,238	329	704	187	2,458
D	KPC	1,883	257	560	77	2,777
D	Short-Term	1,599	369	3,456	682	6,106
	Total	**4,720**	**955**	**4,720**	**946**	**11,341**
P	APC	1,238	329	704	187	2,458
P	KPC	1,883	257	560	77	2,777
P	Short-Term	1,064	249	2,944	568	4,825
	Total	**4,180**	**835**	**4,208**	**832**	**10,055**

Source. Revision FORPLAN Analysis Reports, A-D,P_Sale_don, June 1991

[1] Sawlog plus utility volume.

Cumulative Effects

The following cumulative effects analysis considers total Forest-wide acres managed for timber production. Figure 3-40 displayed the tentatively suitable lands (those that can be considered for timber harvest activities), the available lands (that portion of the tentatively suitable land available for harvest by alternative), and the suitable-scheduled lands (those acres scheduled to be harvested by regeneration cutting, and which are the basis of the alternative's allowable sale quantity).

A mix of each of the four strata classes is harvested by alternative. The high volume classes (Strata C and D) combined, on long-term sale offerings, will be harvested proportional to their occurrence by each of the TLMP Management Areas.

Using 1954 as a base year for existing strata classes, Forest-wide the high volume strata classes (Strata C and D) remaining at the end of 150 years would range from 78 percent (Alternative A) to 64 percent (Alternative D) . The medium volume (Strata B) strata remaining at the end of 150 years would range from 82 percent (Alternative A) to 69 percent (Alternative D). Acres

associated with the low volume strata (Strata A) remaining at the end of 150 years would range from 86 percent (Alternative A) to 77 percent (Alternative D).

The percent of each Strata remaining after 150 years and distribution of timber harvest among the four strata are displayed in Tables 3-136 and 3-137 using 1954 as the base year (e. g. 100 percent).

Table 3-136

Percent of Volume Class remaining after 150 years

Strata	Total Productive Forest, 1990 (acres)	Alternatives A	B	C (percent remaining)	D	P
A	2,652,116	86	83	78	77	81
B	2,020,259	82	78	70	69	72
C	497,684	80	76	66	66	69
D	89,642	70	67	55	54	57

Source: Revision data base 6/91, FORPLAN analysis, A-B,P_ND_Don, June 1991.

Table 3-137

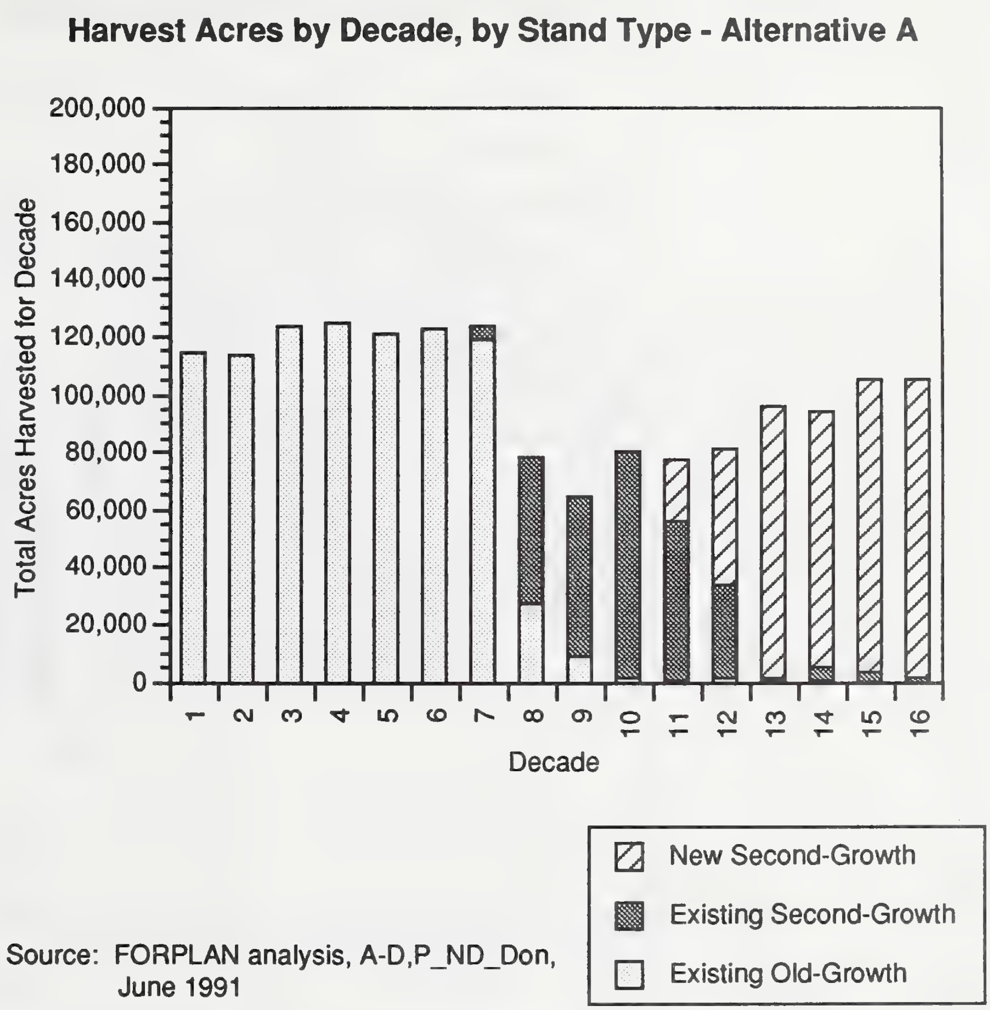
Distribution of timber harvest (regeneration cutting) by strata (Percent of total acres harvested)

		Alternatives														
	A		B			C			D			P				
	Available		Decade			Decade			Decade			Decade			Decade	
Strata	Percent	1	2	5	1	2	5	1	2	5	1	2	5	1	2	5
A	45-46	23	16	52	23	15	53	18	21	50	13	22	61	15	44	46
B	40-41	50	44	46	50	50	41	58	36	49	61	35	38	63	48	52
C	11	21	37	1	22	33	4	18	38	<1	22	38	<1	15	9	2
D	3	6	2	1	5	2	1	6	5	<1	5	5	<1	6	<1	0

Source: FORPLAN Analysis Reports, A-B, P_ND_Don, June 1991.

Second-growth stands play a significant role in providing timber for future harvest. In all alternatives, second-growth stands enter into the harvest scenario between the seventh decade (Alternatives A and B) and eighth decade (Alternatives C, D, and P) (Figures 3-40 through 3-44). Second growth is a result of past harvest activities between the period 1909 and present. The majority of the harvest has taken place between 1954 and present, which represents the period of time the long-term timber sale contracts have been in operation. New second growth (from future harvesting) enters into the harvest scenario between the ninth and eleventh decades.

Figure 3-40



Source: FORPLAN analysis, A-D,P_ND_Don, June 1991

Figure 3-41

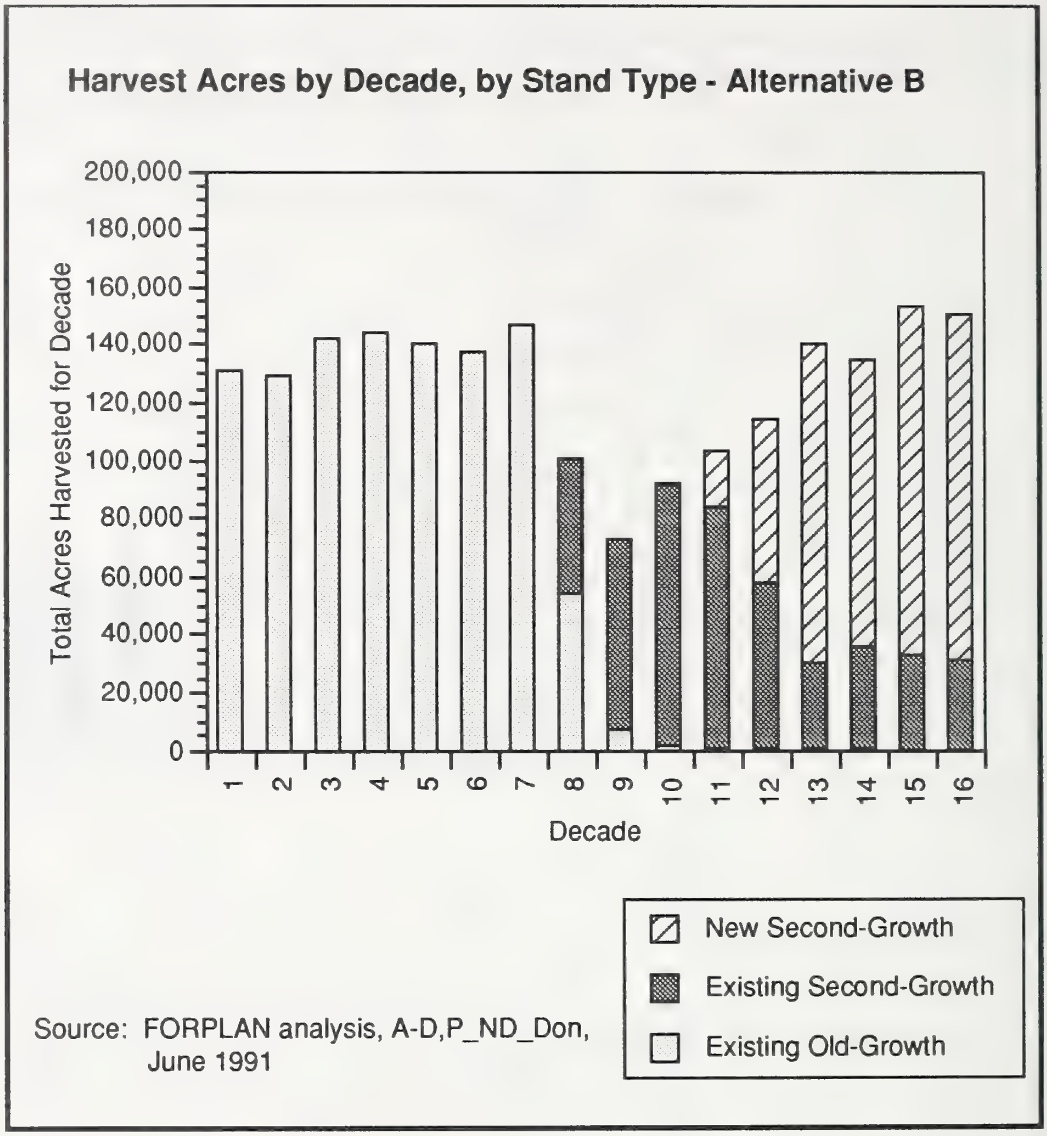
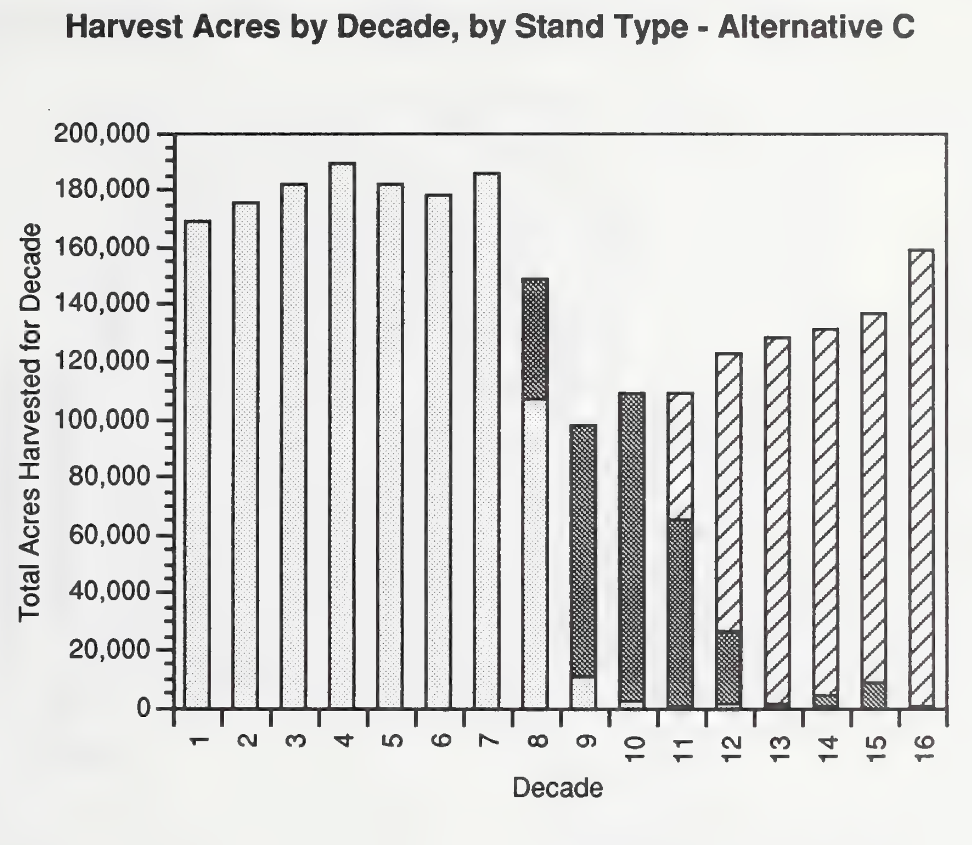
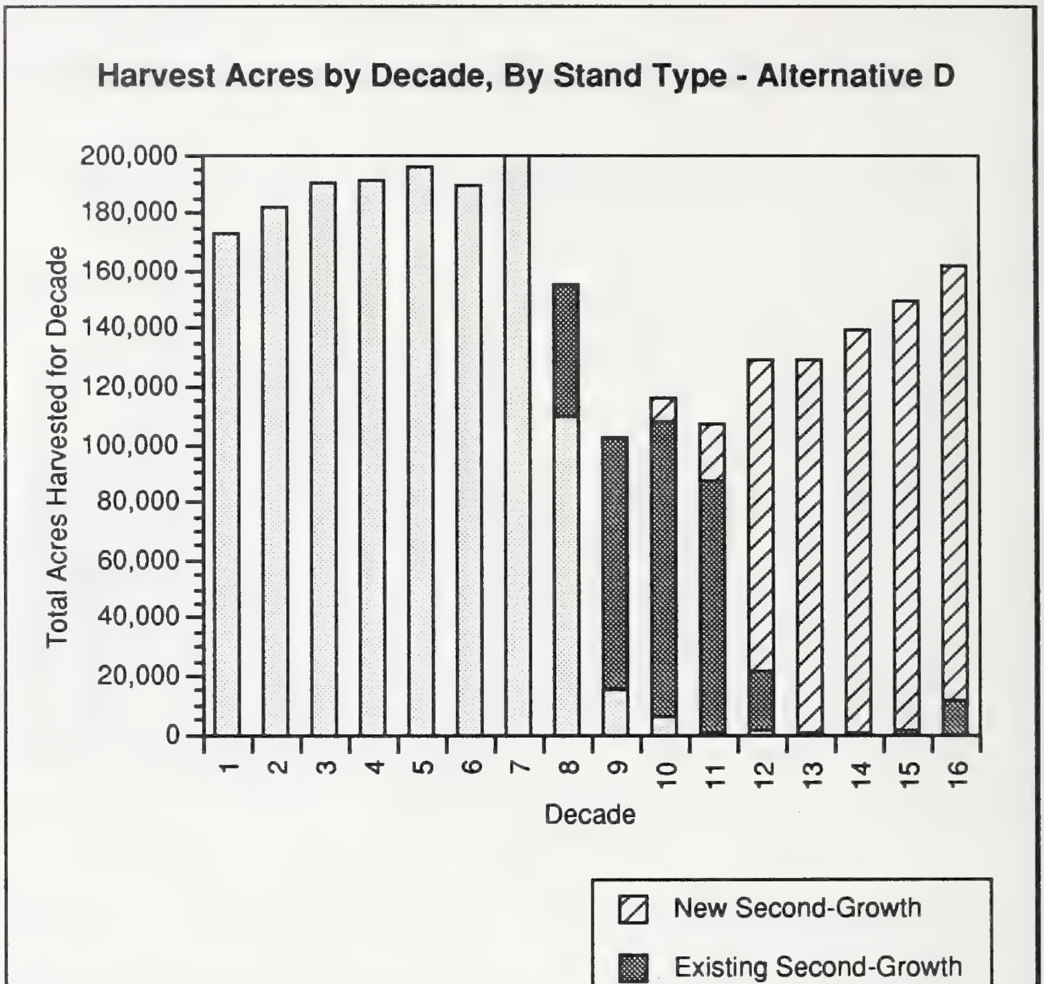

Harvest Acres by Decade, by Stand Type - Alternative B
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Total Acres Harvested for Decade
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Decade
New Second-Growth
Existing Second-Growth
Existing Old-Growth
Source: FORPLAN analysis, A-D,P_ND_Don, June 1991

Figure 3-42



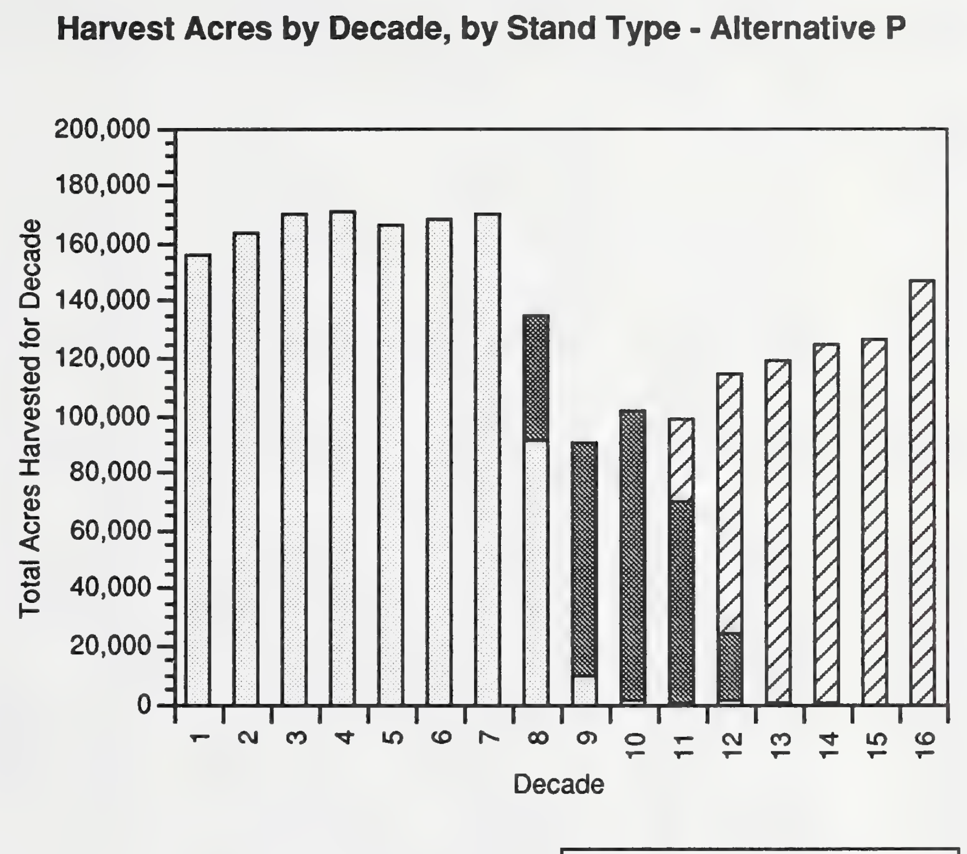
Source: FORPLAN analysis, A-D,P_ND_Don, June 1991

Figure 3-43



Source: FORPLAN analysis, A-D,P_ND_Don, June 1991

Figure 3-44



Source: FORPLAN analysis, A-D,P_ND_Don, June 1991

In general, alternatives which allocate the most acres to development-oriented land allocations will gradually have stands in younger timber age classes, fewer stands of old-growth, and a younger average age of timber stands Forest-wide (90-120 years). The 1979 Tongass Land Management Plan scheduled 17,276 acres for harvest each year. The average annual acres actually harvested between fiscal year 1980-1989 was 8,085 acres, less than one half the scheduled acres. The productive old-growth forest was reduced by a total of about 1.5 percent during the last 10 years.

Table 3-138 displays the number of acres of tentatively suitable lands that are scheduled to be harvested over the planning horizon for each Management Area. The table gives an indication the percentage of each Management Area that—over time—will be in younger timber age classes.

Table 3-138

Scheduled suitable acres by alternative and Management Area (MA)[1]

Mgmt Area	Alternative A Acres	Alternative A Percent of MA	Alternative B Acres	Alternative B Percent of MA	Alternative C Acres	Alternative C Percent of MA	Alternative D Acres	Alternative D Percent of MA	Alternative P Acres	Alternative P Percent of MA	Total MA Acres
Chatham Area											
C03	239	0.8	3,537	11.6	9,210	30.1	3,737	12.2	7,251	23.7	30,602
C05	639	2.1	0	0.0	0	0.0	220	0.7	0	0.0	30,229
C06	479	0.7	479	0.7	879	1.2	1,842	2.6	879	1.2	72,211
C07	6,426	16.3	6,742	17.1	7,063	18.0	7,124	18.1	5,921	15.1	39,335
C10	1,460	0.5	2,195	0.7	304	0.1	3,847	1.3	200	0.1	297,655
C12	20	0.3	20	0.3	0	0.0	3,444	45.2	0	0.0	7,622
C13	11,197	15.1	24,872	33.6	17,193	23.2	33,200	44.8	17,193	23.2	74,121
C14	7,767	8.4	7,985	8.6	27,133	29.2	8,119	8.7	27,923	30.0	92,978
C15	82	0.1	82	0.1	1,342	1.7	20	0.0	2,262	2.8	79,410
C17	0	0.0	0	0.0	0	0.0	2,985	6.1	0	0.0	49,302
C18	9,275	9.1	9,275	9.1	9,435	9.2	8,234	8.1	10,656	10.4	102,183
C19	10,377	17.7	10,377	17.7	10,637	18.2	10,418	17.8	11,157	19.0	58,578
C20	0	0.0	0	0.0	0	0.0	1,644	26.0	0	0.0	6,311
C21	7,454	10.8	7,494	10.8	23,919	34.6	17,025	24.6	14,378	20.8	69,120
C25	200	0.6	0	0.0	80	0.2	40	0.1	0	0.0	33,197
C27	800	3.8	2,741	13.0	2,781	13.2	2,781	13.2	1,660	7.9	21,008
C28	0	0.0	16,241	20.0	16,721	20.6	18,080	22.3	13,155	16.2	81,130
C29	1,118	1.1	9,180	8.8	8,976	8.6	20,483	19.6	14,439	13.8	104,292
C30	18,898	16.7	22,199	19.7	27,123	24.0	32,275	28.6	23,958	21.2	112,824
C31	20,701	28.0	20,721	28.0	29,573	40.0	27,521	37.2	21,354	28.9	73,882
C32	3,641	14.6	4,281	17.2	5,819	23.4	5,639	22.6	5,878	23.6	24,918
C33	0	0.0	0	0.0	0	0.0	1,701	4.1	3,440	8.3	41,553
C34	11,593	16.0	11,755	16.2	5,560	7.7	18,383	25.3	6,051	8.3	72,571
C37	39,204	30.2	38,225	29.4	36,264	27.9	41,642	32.1	36,265	27.9	129,847
C39	0	0.0	1,736	4.6	3,047	8.0	2,177	5.7	3,131	8.2	38,008
C40	7,557	4.2	7,684	4.3	8,716	4.8	8,310	4.6	5,671	3.1	180,489
C41	11,422	15.4	11,423	15.4	12,628	17.0	13,187	17.8	12,628	17.0	74,143
C43	7,808	7.5	7,809	7.5	12,436	12.0	13,831	13.3	8,099	7.8	104,011
C44	4,274	6.7	5,047	7.9	8,477	13.2	3,059	4.8	6,721	10.5	64,189
C45	80	0.2	80	0.2	100	0.2	170	0.3	80	0.2	53,198
C46	634	3.7	650	3.8	666	3.8	968	5.6	620	3.6	17,301
C48	2,270	2.8	2,574	3.2	2,883	3.5	2,692	3.3	2,028	2.5	81,649
C53	5,898	17.4	18,253	53.9	22,497	66.4	21,882	64.6	19,029	56.1	33,890
C54	1,535	8.7	1,535	8.7	5,877	33.1	1,754	9.9	5,877	33.1	17,729
C55	700	6.0	775	6.7	1,658	14.2	958	8.2	1,102	9.5	11,644
C56	101	0.1	101	0.1	341	0.5	341	0.5	101	0.1	74,046
C57	0	0.0	0	0.0	0	0.0	462	2.3	0	0.0	19,754
C60	0	0.0	0	0.0	0	0.0	21	0.4	0	0.0	5,493
C61	0	0.0	0	0.0	0	0.0	79	0.6	0	0.0	13,010
Stikine Area											
S01	13,114	26.3	13,116	26.3	18,162	36.4	14,264	28.6	18,181	36.5	49,864
S02	138	0.5	138	0.5	0	0.0	10,783	38.3	9,015	32.0	28,188
S04	64,299	44.7	61,865	43.0	71,501	49.7	68,078	47.3	59,015	41.0	143,972
S05	0	0.0	0	0.0	0	0.0	17,418	58.6	0	0.0	29,724
S07	0	0.0	12,313	26.2	14,969	31.9	19,054	40.6	0	0.0	46,960
S08	0	0.0	5,442	33.6	5,442	33.6	6,701	41.4	0	0.0	16,184
S09	28,764	31.4	27,761	30.3	32,117	35.0	39,325	42.9	31,912	34.8	91,686
S10	26,360	21.7	26,941	22.2	28,317	23.4	27,621	22.8	28,317	23.4	121,238
S11	30,156	22.2	31,822	23.4	32,606	24.0	34,451	25.4	32,608	24.0	135,791
S12	539	0.7	1,420	1.9	157	0.2	14,588	19.5	179	0.2	74,860
S13	14,297	9.8	32,812	22.5	36,329	24.9	35,613	24.4	35,122	24.1	145,773
S14	379	13.2	439	15.3	738	25.7	379	13.2	738	25.7	2,875

Table 3-138 (continued)

Mgmt Area	Alternative A Acres	Alternative A Percent of MA	Alternative B Acres	Alternative B Percent of MA	Alternative C Acres	Alternative C Percent of MA	Alternative D Acres	Alternative D Percent of MA	Alternative P Acres	Alternative P Percent of MA	Total MA Acres
S16	12,085	16.7	22,325	30.9	25,365	35.1	25,053	34.6	22,947	31.7	72,338
S17	24,676	32.3	25,180	32.9	28,647	37.5	30,182	39.5	27,901	36.5	76,421
S18	2,588	30.0	1,680	19.5	3,536	41.0	6,046	70.0	2,748	31.8	8,633
S19	44,107	37.5	44,107	37.5	44,732	38.0	48,846	41.5	44,732	38.0	117,584
S20	14,604	12.5	15,331	13.1	16,588	14.2	20,587	17.6	16,367	14.0	116,935
S21	1,857	16.3	3,344	29.4	4,733	41.6	8,779	77.2	3,242	28.5	11,376
S22	1,412	9.8	1,412	9.8	5,525	38.2	6,608	45.6	5,525	38.2	14,480
S23	30,392	20.0	32,165	21.2	43,685	28.8	49,477	32.6	43,683	28.8	151,683
S25	30,660	23.8	33,014	25.7	38,137	29.7	36,518	28.4	37,295	29.0	128,602
S26	14,019	11.8	15,982	13.4	25,424	21.4	18,167	15.3	22,457	18.9	118,986
S29	0	0.0	0	0.0	9,758	6.5	6,850	4.5	9,047	6.0	151,271
S31	5,501	10.4	4,880	9.2	7,503	14.2	7,541	14.2	7,503	14.2	52,974
S33	10,167	22.2	10,608	23.1	11,246	24.5	13,566	29.6	11,244	24.5	45,867
S35	10,515	10.4	18,233	18.0	19,913	19.6	18,377	18.1	18,489	18.2	101,365
Ketchikan Area											
K01	28,872	40.5	34,351	48.2	40,885	57.4	39,117	54.9	39,561	55.5	71,257
K03	40,263	37.0	46,944	43.1	55,517	51.0	62,000	57.0	50,923	46.8	108,805
K04	6,026	24.0	8,838	35.2	11,179	44.5	15,619	62.2	11,064	44.1	25,098
K05	29,266	70.1	29,308	70.2	30,803	73.8	33,156	79.5	30,806	73.8	41,729
K06	2,338	9.2	0	0.0	98	0.4	10,168	39.9	9,251	36.3	25,486
K07	53,143	44.9	72,952	61.7	75,062	63.4	81,803	69.1	74,553	63.0	118,310
K08	42,667	34.5	53,136	42.9	66,188	53.4	61,405	49.6	57,310	46.3	123,835
K09	52,094	54.8	52,178	54.9	54,355	57.2	54,979	57.8	52,296	55.0	95,068
K10	17,871	37.1	17,871	37.1	19,734	40.9	21,415	44.4	19,694	40.9	48,194
K11	27,997	62.8	27,995	62.8	30,699	68.9	35,702	80.1	30,701	68.9	44,554
K13	0	0.0	0	0.0	1,968	9.0	2,829	12.9	0	0.0	21,917
K14	32,943	24.0	32,987	24.1	40,313	29.4	35,633	26.0	37,844	27.6	137,130
K15	16,279	30.5	20,900	39.2	22,638	42.5	18,478	34.6	21,440	40.2	53,328
K17	23,659	28.1	24,525	29.1	33,240	39.4	29,071	34.5	30,371	36.0	84,280
K18	23,141	21.7	22,382	21.0	41,805	39.2	36,932	34.6	41,806	39.2	106,686
K19	3,429	8.0	3,369	7.8	7,620	17.7	581	1.3	5,458	12.7	43,041
K20	10,264	27.0	11,699	30.8	17,079	45.0	17,258	45.4	13,420	35.3	37,983
K21	12,567	8.5	22,555	15.2	40,316	27.2	42,179	28.4	25,126	16.9	148,481
K22	20,077	21.5	3,270	3.5	37,214	39.8	38,556	41.2	34,222	36.6	93,566
K24	16,501	37.4	17,182	39.0	18,286	41.5	22,091	50.1	18,286	41.5	44,104
K25	10,128	16.2	14,234	22.8	19,539	31.3	23,708	37.9	19,539	31.3	62,506
K26	0	0.0	0	0.0	0	0.0	8,591	35.1	0	0.0	24,460
K28	6,502	8.1	5,740	7.1	17,194	21.4	22,545	28.1	6,088	7.6	80,354
K29	13,010	16.8	13,052	16.9	30,604	39.5	13,969	18.0	27,799	35.9	77,407
K30	19,047	16.4	19,448	16.8	37,089	32.0	24,681	21.3	36,533	31.5	116,066
K32	43,848	24.8	54,156	30.6	66,128	37.4	68,413	38.7	63,083	35.7	176,716
K34	2,060	8.9	1,160	5.0	4,398	19.0	3,098	13.4	3,098	13.4	23,090
K35	33,928	35.0	33,309	34.4	36,862	38.1	41,345	42.7	36,861	38.1	96,875
K36	0	0.0	0	0.0	0	0.0	160	1.4	0	0.0	11,192
K37	0	0.0	0	0.0	0	0.0	2,738	24.3	0	0.0	11,272
K39	8,914	11.8	16,632	22.0	22,073	29.2	18,274	24.2	21,891	28.9	75,661
K40	0	0.0	0	0.0	0	0.0	800	14.5	0	0.0	5,506
K41	1,642	4.2	1,181	3.0	1,962	5.0	1,261	3.2	1,239	3.2	38,952
K44	0	0.0	0	0.0	7,039	11.3	4,617	7.4	3,719	6.0	62,295
K45	0	0.0	0	0.0	0	0.0	20	0.0	0	0.0	67,730
Total	**1,173,000**		**1,360,000**		**1,732,000**		**1,818,000**		**1,601,000**		

Source: Forest Service FORPLAN Analysis, A-D, P_Suit_SK, July 1991

For all of the alternatives, standing volume will decline over a period of decades until a point of equilibrium is reached where harvest equals growth. On lands where timber management prescriptions have been implemented, per-acre growth rates will be greater at the end of the planning period than at the beginning because regenerated managed stands will grow at a faster rate than existing unmanaged stands.

As more stands are harvested and managed for timber production, there will be a gradual decrease in the population of the more shade-tolerant western hemlock. Sitka spruce is favored in planting and as crop trees during precommercial thinning. Over time, fluting in hemlock, mistletoe infestation, and other natural damaging agents will decrease in stands managed for timber production as more vigorous second-growth stands develop. There will be less breakage and logging defect in second-growth stands than in existing overmature old-growth stands. Second-growth stands will be more economic to harvest because of higher volume per acre, existing road networks, and the ability to use more efficient logging equipment on the smaller timber.

The per-acre yield of commercial products from the Forest would increase as stands are managed to maintain fast growth rates by controlling competing vegetation. Growth can also be improved through precommercial thinning.

Mitigation

A range of activities can be used to avoid, minimize, or compensate for impacts to timber quantity and quality. The types of mitigation measures will not vary by alternative, but the degree to which they are applied will depend on the rate and location of timber harvest activities.

The effects of other resource activities on timber, especially on the allowable sale quantity, can often be mitigated through intensity of timber management activities on lands scheduled for harvest. Mitigative measures consist of second-growth management and new technology. The degree to which these mitigative measures are applied is closely related to the amount and location of land available to be considered for timber management activities. Effects of other resource activities within limited acres available for timber harvest consideration have the potential of lowering the amount of timber actually offered for sale in relation to the allowable sale quantity, thus directly impacting the established timber industry.

Second Growth Management

Timber yields from the Tongass are expected to increase substantially from the conversion of old-growth to second-growth. These areas previously harvested have roads in place and many have been precommercially thinned. The investments in these lands need to be protected so that yields associated with the harvest of remaining old-growth as well as second-growth stands can be recaptured in later entries. Loss of these areas to land designations precluding timber harvest will have the potential of significantly impacting predicted timber supply in the future decades.

New Technology

Higher yields may also come from new technology, allowing commercial thinning in stand types typical to Southeast Alaska. Effectiveness will result if thinning operations can be achieved over long yarding distances with minimal damage to residual timber.

Fertilization of regenerated stands has been tested in some locations of the Tongass (such as Thomas Bay on the Stikine Area). Fertilization of stands on some soil types has increased per-acre yield and shows promise, although the costs associated with application and maintenance

are high. Application of this method of increasing timber yields will be dependent on the effects on other resources, costs of application, and returns in timber volume as a result of use.

Research is needed that would allow uneven-aged management of timber stands on a broad scale while maintaining the health and vigor of residual timber. Today's harvest systems are ineffective on large land areas with steep topography, due to damage to residual timber stands, cost of operations, and ineffectiveness of system types on large timber. (Refer to Appendix G.)

Transportation

Affected Environment

Changes Since the DEIS

The Revision Data base has been updated to include all forest development roads constructed through September 1990. Average costs of roads considering a three-year average, 1984-1987, have been computed for the economic and social environment sections. Information from 1987-1990, when updated to 1990 dollars, was checked and found to not have varied significantly from the 1984-1987 average.

Background

There are primarily four modes of travel in Southeast Alaska: air, water, roads, and trails. Historically, marine transportation has been the major method of moving freight and passengers, however, during the last three decades air services have developed to serve the growing demand for rapid transportation between communities within Alaska and to the contiguous United States. On National Forest land, road and water transportation facilities initially have been developed to support timber harvest activities.

Air and Marine Transportation

Air traffic demands in Southeast Alaska are met by commercial airlines, air taxis, and helicopters. The major Southeast Alaska communities are served by at least two daily passenger jet flights. Scheduled sea/land air taxi operations provide service carrying passengers, small freight and mail to outlying communities. Helicopters are used extensively to transport people and cargo to remote inland locations.

Marine traffic corridors are well defined in Southeast Alaska. The Alaska Marine Highway Ferry System provides transportation of passengers, freight and vehicles throughout Southeast Alaska, with connections to British Columbia and Washington State. Several cruiseship lines provide transportation for tourists during the summer season. Tug and barge lines provide general cargo, heavy freight, and log-towing services. Ocean freighters provide shipping from Southeast Alaska ports for products from both the National Forest and private lands. The waterways also receive extensive local use by boaters, hunters, fisherman, divers, and sea kayakers.

Access to Continental Road Systems, Internal Ties, Utility Corridors

Access to the continental road system is currently provided at only five points in Southeast Alaska by the Alaska Marine Highway (all are water ports.) Three of these connections are to the United States communities of Haines and Skagway, Alaska, and Bellingham, Washington, while the other two connections are to the Canadian communities of Stewart and Prince Rupert, British Columbia. A private ferry provides service between Vancouver, British Columbia and Haines, Alaska during the summer.

Several opportunities exist for State Highways that could connect some communities of Southeast Alaska to the continental road system (*Southeast Alaska Transportation Plan, State of Alaska, Department of Transportation and Public Facilities*, June 1986). The route receiving the most attention recently was the Bradfield Canal/Craig River corridor. It would be possible to connect Wrangell and Ketchikan to the continental road system by roads and ferries. Known mineral reserves in British Columbia have sparked interest in road corridors from: 1) Yakutat to Dry Bay then to a mine site in British Columbia along the Alsek River; 2) the Bradfield Canal/Craig River Corridor to Wrangell; and, 3) the Taku River Corridor connecting British Columbia to Juneau. There also continues to be interest in a Juneau-Haines/Skagway road corridor either on the mainland north of Berners Bay or with a ferry from north of Berners Bay to the Chilkat Peninsula.

The State of Alaska's Southeast Alaska Transportation Plan (ADOTPF 1986), has identified three potential internal corridors: Sitka to Baranof or Rodman Bay, Kake to Petersburg, and upgrading the Prince of Wales road system from Control Lake to Red Bay. Prince of Wales Island has the only road system in Southeast Alaska that interconnects island communities.

The Alaska Power Authority has proposed corridors for transmission lines/undersea cables to link many Southeast Alaska communities to British Columbia. A powerline from Tyee hydropower site along the Bradfield Canal/Craig River road corridor route to Canada is one of the identified corridors.

Forest and State Highways

When a Forest development road 1) provides a connection between communities; 2) serves local needs such as mail delivery; or, 3) connects public roads within the National Forest, it can be designated as a Forest Highway. Usually, Forest Highways are upgraded to State Highway standards, and jurisdiction is relinquished to the State. To date, the Alaska Department of Transportation and Public Facilities, the Federal Highway Administration, and the Forest Service have agreed to designate a potential 362 miles as Forest Highways, and the State has been given the jurisdiction and maintenance responsibility on 181 miles of existing Forest Development Roads. Since the Forest Service does not have the authority to provide public services, such as snow removal, the State's assumption of jurisdiction and maintenance responsibility usually benefits the surrounding communities. There are about 500 miles of State Highway in Southeast Alaska (ADOTPF December 1985), including some Forest highway mileage.

Forest Development Roads

Forest development roads (Forest roads) provide access to National Forest lands and are classified as arterial, collector, and local roads. Arterial roads serve large land areas and usually connect to public highways. Collectors serve smaller land areas, are usually connected to Forest arterial roads or public highways, and collect traffic from Forest local roads. Local roads connect terminal facilities with Forest collector, arterial, or public highways.

All classes of roads are built to standards appropriate to their planned uses, considering safety, cost of transportation, and impacts on lands and resources.

Forest roads are also managed by a system of maintenance levels (Table 3-139). Those roads in maintenance level 1 are managed in a storage or closed category, primarily for resource protection and safety reasons. Maintenance level 2 roads are kept open for high clearance vehicles (pickups); level 3, 4 and 5 are maintained to be suitable for use by low clearance vehicles (passenger cars); those in level 4 and 5 provide a more comfortable ride.

All Forest roads, except for those in a few administrative sites and campgrounds, are single lane constructed with blasted quarry rock and designed for off-highway loads. Typical local roads are 14 feet wide, with a rough gravel surface and generally have traffic moving about ten miles per hour. High standard arterial roads are normally 16 feet wide, may have a smooth gravel surface, and are designed for traffic to be able to attain speeds of up to 30 miles per hour. Travel speed on lower standard roads is often controlled more by surface roughness than by horizontal alignment or road gradient.

Table 3-139

Existing forest development roads by functional class and maintenance level by each administrative level in miles

Unit	Functional Class	Road Maintenance Level 1	2	3	4	5	Total All Levels
Chatham	Arterial	15	0	68	0.0	0.0	
	Collector	131	85	105	8.0	0.0	
	Local	103	56	70	5.0	0.2	
	All	**249**	**141**	**243**	**13.0**	**0.2**	**646**
Stikine	Arterial	0	32	15	1.9	0.0	
	Collector	11	191	107	0.0	0.0	
	Local	255	98	3	0.1	0.0	
	All	**266**	**321**	**125**	**2.0**	**0.0**	**714**
Ketchikan	Arterial	10	21	155	81.0	0.0	
	Collector	72	267	84	11.0	0.0	
	Local	576	470	245	0.0	3.0	
	All	**658**	**758**	**484**	**92.0**	**3.0**	**1,995**

Source: Regional Office, Engineering, April 1991

Miles of Roads and Road Investments

On the Tongass, the demand for roads has primarily been a function of the demand for access to timber resources. The maintenance and reconstruction requirements of the existing system depend mainly on the volume of timber hauled and to a much lesser extent on recreational use. The amount of future construction is anticipated to continue to be dependent primarily on the need to access timber resources. Minor new construction for recreational purposes (such as access to a new trailhead or campground) may occur.

The Forest Development Road System includes 3,355 miles of road which provide access to about nine percent of the Tongass National Forest. About 850 miles of Forest roads are not managed for car and truck use, but foot traffic and bicycles are encouraged. Off-highway vehicles (OHV), such as trailbikes and snowmobiles, are permitted on many of these roads, although they are prohibited on certain roads for economic, wildlife, recreation or safety reasons. Of the 2,180 miles of road open to public motorized vehicle use, about 1,150 miles are connected to communities. The remainder are isolated island road systems that require chartered barge or ferry access (see existing road map in map packet).

Table 3-140 is a list of miles of new construction and reconstruction that has occurred on the Forest since 1981.

Table 3-140
Total road construction/reconstruction[1]

Fiscal Year	Construction Miles Constructed by: Purchaser	Construction Miles Constructed by: USFS	Reconstruction Miles Reconstructed by: Purchaser	Reconstruction Miles Reconstructed by: USFS	Total Miles
1981	122.4	6.7	59.2	11.3	199.6
1982	194.8	24.5	0.0	0.0	219.3
1983	40.9	63.5	19.4	0.0	123.8
1984	8.6	65.1	22.4	34.8	130.9
1985	18.0	41.7	29.9	3.3	92.9
1986	71.5	40.4	6.7	20.3	138.9
1987	51.1	23.4	22.3	28.4	125.2
1988	70.1	33.4	29.7	5.8	139.0
1989	102.4	3.3	46.3	4.4	156.4
1990	101.7	3.5	24.0	2.9	132.1
1991[2]	97.0	21.3	33.0	0.0	151.3
1992[2]	88.6	10.8	25.0	0.3	124.7

Source: RO-Engineering, June 91

[1] Does not include temporary roads constructed by the timber operator.

[2] Estimated

The 1979 Plan indicated a need to make road investments (pre-roading) in addition to those to be constructed by the timber purchaser to make the 4.5 billion board foot allowable sale quantity attainable (TLMP, Appendix H, page H-5). In 1978 dollars, the 1979 Plan anticipated a need for an average annual investment of 17.7 million dollars by the Forest Service into road and log transfer facility construction to offset the costs of anticipated environmental constraints and economically marginal timber offerings. In 1985, this calculation was made again and updated to 1985 dollars in the Status of the Tongass 1985 Report. That Report (page 11) indicated an average annual investment level, including construction and engineering support costs, of 18.8 million dollars to construct an average annual amount of 46 miles of road for pre-roading.

Table 3-141 displays a summary of the road and log transfer facility investments and associated engineering support costs that were made during the period 1981 through 1990 with an estimate for 1991.

Table 3-141
Road investments and miles constructed by the Forest Service

Fiscal Year	Construction Miles	Construction Dollars	Reconstruction Miles	Reconstruction Dollars	Log Transfer Sites Dollars	Engineering Support Cost Dollars
1981	6.7	1,946,000	11.3	1,086,000	0	1,002,000
1982	24.5	6,333,000	0.0	0	1,776,000	2,557,000
1983	63.5	9,929,000	0.0	0	596,000	5,242,000
1984	65.1	10,391,000	34.8	475,000	481,000	5,121,000
1985	41.7	9,706,000	3.3	469,000	1,302,000	4,503,000
1986	40.4	9,504,000	20.3	2,489,000	391,000	3,488,000
1987	23.4	5,423,000	28.4	3,161,000	1,368,000	4,121,000
1988	33.4	7,743,000	5.8	1,453,000	182,000	4,290,000
1989	3.3	563,000	4.4	1,805,000	520,000	3,180,000
1990	3.5	1,072,000	2.9	2,260,000	1,702,000	4,639,000
1991[1]	21.3	5,250,000	0.0	1,552,000	1,445,000	4,405,000
Total	**326.8**	**67,860,000**	**111.2**	**14,750,000**	**9,763,000**	**42,548,000**

Source: RO-Engineering, June 1991.

[1] Estimated

Log Transfer Facilities

Transport of harvested timber from isolated islands in Southeast Alaska requires both land and water routes to reach processing facilities. This normally requires that harvested log bundles be removed from log trucks and placed in saltwater where the log bundles are then towed to pulp or sawmills. Log transfer facilities are needed to transfer logs to and from the water and to construct "log booms" to contain the log bundles for towing. There are a total of 116 log transfer facility sites existing in Southeast Alaska on National Forest lands, and an additional 17 sites which the Forest Service uses or is seeking agreements to use on State or private lands. In addition to the log transfer facility guidelines in the Regional Guide, the Forest Service has adopted the *Log Transfer Facility Siting, Construction, Operation, and Monitoring/Reporting Guidelines* developed by the Alaska Timber Task Force (1986). The Environmental Protection Agency has adopted these guidelines as standard conditions for permits issued under provisions of the Clean Water Act.

Cost Share

The duplication of road systems or facilities is avoided, whenever possible, by sharing the costs of construction and/or maintenance with other landowners. Five "share cost agreements" have been entered into with other separate landowners: Sealaska Corporation, Huna Totem Corporation, Goldbelt Corporation, Cape Fox Corporation, and Yak-Tat Kwaan Corporation, to develop road networks to satisfy joint transportation needs. Share cost agreements have been entered into with the following Native Corporations for log transfer facilities: Goldbelt Corporation (Hobart Bay); Huna Totem and Sealaska Corporations (Long Island); and Yak-Tat Kwaan (Broken Oar).

Road Construction Techniques

Road construction takes place on terrain that is composed almost completely of soils that will not support heavy equipment. The method of construction is to overlay the soft native material

with quarry rock to a depth necessary to support the hauling vehicles. The minimum depth of quarry rock required is often more than thirty inches.

The Alaska Regional Guide, which incorporated the Southeast Area Guide, and the Tongass Land Management Plan, as amended, 1985-86, provide standards and guidelines pertaining to transportation system development and planning.

Off-Highway Vehicle Management

The goal of off-highway vehicle management is to ensure resource protection, public safety of all users, minimum conflicts between users, and diverse opportunities for Forest users. Applicable laws and regulations governing off-highway vehicles include the NFMA implementing regulations (36 CFR 261 and 295) and ANILCA Sections 811 and 816.

Alaska Wilderness areas and National Monuments are closed to off-highway vehicle use except for snowmachines. There is a specific exception for subsistence, allowing on all public lands (including wilderness and monuments) the use of motorboats, snowmachines, and other means of surface transportation (off-highway vehicles) that have been traditionally employed, subject to reasonable control (ANILCA, Section 811).

Except for Wilderness Areas, National Monuments, and designated Research Natural Areas, the Forest is designated open to off-highway vehicles. In site-specific locations where conflicts with other users, public safety, and damage to resources could occur, site-specific closures that may prohibit or restrict use may be considered. Environmental analysis is performed at the local site-specific level, and any resulting notices of closures are posted at local ranger district offices. A specific set of closures was consolidated in the Juneau Area in November 1985 as the "Off-Road Vehicle Travel Plan" for the Juneau Ranger District. This travel plan is incorporated here by reference.

Methodology and Scientific Accuracy

Estimates of the amount of future road development are based on the continuing assumption that essentially all new roads will be constructed to access timber harvest areas. Nearly all of the existing forest development road system has evolved in support of timber harvesting. That assumption is not expected to change in the foreseeable future.

The likely numbers of miles of new roads are estimated by considering the following sources of information for each of the geographic zones outside of Wilderness:

- the ratio of tentatively suitable forest lands to total land area;
- a logging system-transportation plan based on aerial photo interpretation; and,
- the miles of existing roads within roaded areas that have had previous timber harvesting.

From these three sources of information a ratio of miles of new road needed per acre of timber harvest was developed for both unroaded areas and areas that have had previous timber harvesting. New miles of road were then estimated by decade by alternative based on the FORPLAN estimates of timber harvest for each of the 1979 TLMP land use designations. Any attempt to refine the type of terrain or determine specific road locations, within any given TLMP land use designation, is beyond the scope of this programmatic plan.

Transportation

Environmental Consequences

This section estimates the effects of each alternative on the transportation system of Southeast Alaska, and of log transfer facilities on the upland and benthic environment. The environmental consequences of road construction are discussed in sections of this document relating to the specific resource.

Direct, Indirect and Cumulative Effects

Air, Marine, Forest and State Transportation Systems

The air and marine transportation systems are somewhat affected by the number of people who live in Southeast Alaska. Population changes by alternative are expected to correspond to changes in employment. All alternatives show low to moderate increases in employment (relative to the 1988 base year) for the first decade. These could lead to increased needs for air or marine transportation.

Forest development roads may provide opportunities for connection of remote communities to each other, or to the Alaska Marine Highway. Each alternative would build or extend isolated road systems and extend road systems connected to communities. This situation might change the kind of service provided by the Alaska Marine Highway from long distance mainline service to shuttle service between island and mainland road systems or communities. If Forest development roads become major high use connections between communities, the Alaska Marine Highway, or serve local needs, they may be considered for conversion to Forest Highway. Usually these roads are arterials and collectors. Alternative D would construct the most new roads; Alternative A would construct the least. The existing transportation system is composed of about 12 percent (399 miles) arterials, 32 percent collectors (1,072 miles) and 56 percent (1884 miles) of local roads. Future road development is expected to have similar proportions.

Access to Continental Road System and Transportation and Utility Systems

The land use designations proposed in the Proposed Revised Plan are classified as either "windows," where corridors do not conflict with the proposed management objective, or "avoidance areas," where corridors do conflict. The Alaska National Interest Lands Conservation Act, Title XI expands authorities to permit the construction of transportation or utility corridors through areas designated by legislation, such as Wilderness or National Monuments. The effects of the alternatives on transportation and utility systems are described in the Lands Section of this document, and a description of potential corridors may be found in Chapter 3, "Lands," Analysis of the Management Situation, Tongass National Forest, January 1990.

Alternatives B, D and P all propose the Transportation and Utility System Land Use Designation for vital transportation and utility system linkages on the Forest, and for identified state routes, some providing linkages to Canada (see Map Packet, Long-term Sale Boundaries, Timber Sale Schedule and Transportation and Utility Systems Corridor Map). As noted above, ANILCA Title XI provides the authority to construct such linkages in all land use designations under specific authorities. Specific routes were emphasized those alternatives where they were deemed important to local and regional economies and rural development. The Juneau-Haines corridor, Taku River corridor, and the East Bradfield River corridor have received the most attention in recent years.

Forest Development Roads

Table 3-142 displays expected new road development after the first, fifth, and tenth decades by alternative. The forest development road system is currently 3,355 miles, and is expected to be 99 percent complete by the end of the tenth decade in all alternatives.

Table 3-142

Cumulative miles of likely new road development by Administrative Area[1]

Administrative Area	End of Decade 1	2	5	10
Alternative A				
Chatham	209	428	606	796
Stikine	498	949	1,327	1,688
Ketchikan	647	1,310	1,975	2,662
Total	**1,354**	**2,687**	**3,908**	**5,150**
Alternative B				
Chatham	282	575	909	1,176
Stikine	582	1,105	1,588	2,191
Ketchikan	712	1,444	2,200	2,985
Total	**1,576**	**3,124**	**4,597**	**6,252**
Alternative C				
Chatham	395	761	1,185	1,379
Stikine	692	1,341	1,928	2,705
Ketchikan	1,120	2,332	3,459	4,740
Total	**2,207**	**4,434**	**6,570**	**8,822**
Alternative D				
Chatham	382	796	1,141	1,520
Stikine	769	1,494	2,144	2,985
Ketchikan	1,084	2,247	3,271	4,536
Total	**2,235**	**4,537**	**6,556**	**9,040**
Alternative P				
Chatham	347	686	1,042	1,195
Stikine	645	1,236	1,777	2,488
Ketchikan	1,020	2,124	3,135	4,304
Total	**2,012**	**4,046**	**5,954**	**7,987**

[1] Not included are approximately ten to twenty percent additional miles of short-term single purpose roads to access individual timber harvest units that will be needed for each alternative. These short-term roads are closed upon completion of the timber harvest operation.

The above table indicates Alternative D would lead to the most miles of roads followed by Alternative C (2 percent less than D), Alternative P (9 percent less than D), and Alternative B (31 percent less than D). Alternative A has the fewest number of total miles (43 percent less than D).

Table 3-143 displays the average yearly road construction for each alternative. Totals are shown for each of the Tongass's Administrative Areas.

Table 3-143

Average new road construction in miles per year by decade by Administrative Area

Decade(s)	Administrative Area[1]	A	B	C	D	P
1	Chatham	21	28	40	38	35
1	Stikine	50	58	69	77	65
1	Ketchikan	65	71	112	108	102
	Total	**136**	**157**	**221**	**225**	**202**
2	Chatham	22	29	37	41	34
2	Stikine	45	52	65	73	59
2	Ketchikan	66	73	121	116	110
	Total	**133**	**154**	**223**	**230**	**203**
3-5	Chatham	6	8	14	12	12
3-5	Stikine	13	16	12	22	18
3-5	Ketchikan	22	25	113	34	34
	Total	**41**	**49**	**139**	**78**	**54**
6-10	Chatham	4	5	4	8	3
6-10	Stikine	37	12	16	17	14
6-10	Ketchikan	14	16	26	25	23
	Total	**55**	**33**	**46**	**50**	**40**
1-10	Chatham	8	12	14	15	12
1-10	Stikine	17	22	27	30	25
1-10	Ketchikan	27	30	47	45	43
	Total	**52**	**64**	**88**	**90**	**80**

(Columns A–P are under the spanning header "Alternative".)

This table shows that the Ketchikan Area would likely have the most road construction activity; the Chatham Area the least in all alternatives. Of the new road construction about 44 percent are arterials and collectors, and 56 percent local roads. About 50 percent of the new construction total for each alternative over the planning horizon would be constructed in the first two decades. Since little or no second-growth timber will be ready for harvesting until well into the future (60 or more years) and the Tongass is 83 percent roadless outside of existing Wilderness, any timber harvesting in the first few decades will require a substantial amount of road construction similar to what has been experienced over the past 35 years.

About 35 percent of the roads will not be managed for continuous car and truck use after timber harvesting has occurred, but may allow non-motorized and foot traffic. Bridges may be removed from these roads, and the roads themselves may revegetate naturally. Another 30 percent may be open to motorized vehicles, but isolated from large road systems or communities — the case on remote islands. The remainder would be open to motorized vehicles and connected to communities, and likely be maintained for continued multiple-use activities.

Each alternative will require reconstruction of a portion of the existing road system in each decade. Reconstruction of a road protects the original investment, protects environmental

resources, and makes the road suitable and safe for the intended use. Reconstruction involves the rehabilitation of the original roadbed. Common reconstruction activities include cleaning ditches and culverts, replacing damaged drainage structures, re-installing modular bridges, and grading and shaping of the road surface.

Off-highway Travel

Because of low population and expanses of unroaded and relatively inaccessible areas, the situation in Alaska is different from that found in the lower 48. Steep, densely vegetated terrain limits the use of typical off-highway vehicles (OHV's and also commonly known as ORV's and ATV's) such as three-wheelers and all-terrain vehicles to beaches, communities, road systems, braided river channels, and frozen or snow-covered areas. Trails in Southeast Alaska do not lend themselves well to the use of OHV's because of wet ground conditions which often necessitate the use of boardwalks.

Except in a few specific areas, the Tongass has not experienced the kinds of resource damage typically associated with OHV's that have been experienced elsewhere. Because of this, the Forest Travel Plan designates the entire Forest open to OHV use, unless designated closed in site-specific locations. Closure orders are posted at the local ranger districts and supervisor's offices.

In practice, Federal Regulations prohibit the use of vehicles off roads "in a manner which damages or unreasonably disturbs the land, wildlife, or vegetative resources" (36 CFR 261.13). Muskegs, when they are not adequately covered with snow, are extremely susceptible to damage from OHV's and should not be otherwise operated on. Actively enforcing this prohibition would require a closure order issued in accordance with 36 CFR 261, Subpart B. At present, no broad closures of muskeg areas have been issued, but even with such closures, enforcement would be difficult. An educated and responsible public is needed for the protection of this resource. As the road system expands, more muskeg is available to OHV's and some damage may occur. To date, the incidents have been isolated and minor, but damage, once it occurs, is long-lasting. Road closures to keep OHV's out of specific areas are also an effective tool to mitigate potential OHV impacts.

Transportation System Travel

Travel plans are based on the concept that access is a resource to the people who want to enjoy and use the National Forest. In many places, travel through the National Forest is free from any restrictions. Where there are restrictions, they usually relate to the type of access permitted. An example is the limit on use of motor vehicles in designated Wilderness.

Travel planning includes developing limits for the type of access (pedestrian vs. vehicle) or determining the kind of vehicle use (passenger vehicle vs. high clearance vehicle) to be encouraged in the process of managing access. The wide range of existing and potential uses combined with the range of perspectives and values make the combinations of travel planning varied and challenging.

Long-range transportation planning has not been systematically pursued for the transportation system because of the island geography, lack of infrastructure, and relatively low population of the Tongass National Forest. Identification and satisfaction of a variety of access-related issues have progressed in a number of forums. Arterial connections for transportation throughout Southeast Alaska have been coordinated through an interagency group, including the State of Alaska, involved with transportation and utility corridors. Project level planning such as the 1989-94 KPC Long-term Timber Sale Operating Plan includes access management strategies.

Log Transfer Facilities

Table 3-144 displays the number of new log transfer facilities estimated to be needed for each alternative. These facilities would be constructed over about a 30-year period.

Table 3-144
New Log Transfer Facilities (LTF's)

Administrative Area	Alternative A	B	C	D	P
Chatham	32	44	76	52	64
Stikine	27	27	33	30	29
Ketchikan	39	51	68	61	65
Total	**98**	**122**	**176**	**143**	**158**

Log transfer facilities will impact the marine benthic habitat (plants and animals that live in and on the ocean bottom). Effects are expected from two sources: structural embankment (placing rock in the water) and bark deposition (bark that accumulates underwater). Structural embankment is estimated to cover approximately one-quarter acre per site.

Log transfer facilities are estimated to impact approximately 1.96 acres of marine benthic habitat for the average site (Faris and Vaughan, 1985). Bark and debris accumulation may decrease over time due to water currents, but no estimate on the length of time before a bark accumulation is completely eliminated is known.

Faris and Vaughan (1985) examined the extent of total damage to marine benthic habitat in Southeast Alaska. Their results indicate that from the 90 sites permitted at the time, a total of 176 acres would be impacted (using the 1.96 acre average). This is 0.02 percent of the total estuarine area that is less than 60 feet deep. Moreover, when they examined all of the potential area of bark and debris accumulation from all permitted and proposed sites in Southeast Alaska, they found that a total of 317 acres would be impacted. This is 0.09 percent of the total estuarine area that is less than 60 feet deep in all of Southeast Alaska. This result corresponds with the conclusion of Sedell and Duval (1985) that the evidence of damage on important marine populations (bivalves, crabs and salmonids) was inconclusive because of the small area impacted due to log transfer facilities. This evidence resulted in development of the current siting guidelines, which include avoiding crab habitat and shallow areas at the head of bays, to ensure that impacts are minimized.

The largest effect of bark and debris accumulation is to little neck clams and bay mussels which have been shown to be eliminated when 4 to 5 inches of bark accumulates (Freese and O'Clair, 1987). Further, Conlan and Ellis (1979) report that mollusks and several polychaetes (marine worms) were excluded by bark debris greater than one inch thick and effects of bark may last several decades. From this evidence, it can be assumed that other plants and animals that live in and on the bottom (the marine benthic habitat) would also be affected.

Toxic substances, occurring as leachates from bark, precipitate in saltwater. Leachates, therefore, do not appear to be a major problem in open water or where good water circulation exists (Sedell and Duval, 1985).

The other potential effects associated with log transfer facilities are from log rafts and log storage in saltwater. The area under a log raft may be affected by bark accumulations with effects similar to, but not as concentrated as, those discussed for LTF's. If the raft is stored in a

bay or cove for a long period of time, marine algae may be affected by shading. Occasionally, rafts stored in shallow depths may ground on the bottom. This causes mechanical disruption or compaction of intertidal and subtidal bottom habitats. The effects would not last long, because plants and animals would begin to return shortly after the raft re-floated, unless the site was repeatedly used and log rafts frequently grounded. Current guidelines call for raft storage in areas where they will not ground.

Table 3-145 displays the total estimated acres of marine benthic habitat that would be impacted from log transfer facilities for each alternative using 1.96 acres each.

Table 3-145
Log Transfer Facility marine benthic disturbance over 30 years

	Alternative (Acres)				
	A	B	C	D	P
Existing LTF's	227	227	227	227	227
Proposed LTF's	192	239	345	280	310
Total	**419**	**466**	**507**	**537**	**537**

Table 3-146 displays the amount of upland area that might be disturbed due to log transfer facilities over the next 30 years. This is based on approximately eight acres of upland area for each log transfer site, including small sort yards and camps (Prince of Wales Island Area Plan, Alaska Department of Natural Resources, December 1988, Chapter 2, page 16, Management Guideline B: five acres for log transfer facility and three acres for possible logging camp.) The effects of log transfer facilities on upland areas are similar to the effects produced by road construction.

Table 3-146
Log Transfer Facility upland disturbance (acres)

	Alternatives				
	A	B	C	D	P
Existing LTF's	928	928	928	928	928
Proposed LTF's	784	976	1,408	1,144	1,264
Total	**1,712**	**1,904**	**2,336**	**2,072**	**2,192**

Effects on Other Resources

Further development of the transportation system (primarily in the form of roads and log transfer facilities and the associated quarry and borrow sites for facility construction materials) may compliment or conflict with the production or capability of other resources. Some of these potential interactions are discussed below.

Air Quality

Approximately 5,000 gallons of petroleum products are burned to construct one mile of new road. The first decade new road construction is anticipated to vary from 1,354 miles for Alternative A to 2,235 miles for Alternative D, with the corresponding amount of petroleum products burned at the rate of 5,000 gallons per mile of road constructed. As the total road miles increases, total number of vehicle-miles traveled can be expected to increase with the corresponding increase in pollutants in the form of nitrous oxide and carbon monoxide into the air. The rates of air pollutants are not anticipated to have any measurable affect on air quality.

Cultural and Historical

To date, all surface inspections for cultural resources account for less than one percent of Tongass National Forest acreage. Because of elevation and sea level changes resulting from recent deglaciation and the heavy organic layer on the Forest floor, location of cultural and historical sites is difficult. Therefore, there is a small risk that land-disturbing activities may impact sites whose location is unknown. Alternatives that construct more miles than others would have correspondingly higher risks, though still very small. A mile of road disturbs approximately 5-6 acres per mile of road length. Therefore, a range of 1,354 miles for the first decade in Alternative A up to 2,235 miles in Alternative D would disturb between 8,000 and 13,000 acres (about eight/hundredths of one percent (.08%) of the Forest per decade). Standards and guidelines are provided for inventory and to stop activity on a work site when a previously unknown site is encountered.

Fish and Water Quality

Surface erosion from road rights-of-way is discussed in the Soils and Water sections of this Chapter. Best Management Practices provide for protection of water quality.

Minerals

As road systems are expanded, area that is currently roadless on the Forest becomes roaded. An increased road network provides more opportunities for known and undiscovered minerals to be economically viable for exploration and development.

Old-Growth Forest

Transportation facilities reduce acres of productive old growth and fragment patch size. Over the 150-year planning horizon, transportation facilities are estimated to take from 27,500 acres to 39,500 acres out of production (plus 10-20 percent for temporary roads). There are currently 5.05 million acres of productive and 3.43 million acres of unproductive old growth on the Forest. Roads over the planning horizon would have a direct impact on up to five/tenths of one percent on the productive old growth and four/tenths of one percent on the unproductive old growth.

Marine Systems

Roads and log transfer facilities can effect marine systems, estuaries, and their productivity. Any activity that impacts the State Tidelands requires a State Tideland permit and U.S. Army Corps of Engineers permits. That activity must also be consistent with State Coastal Zone Management policies to the extent practicable.

Recreation, Wildlife, and Subsistence

Expansion of the road network and the associated effects on the Recreation Opportunity Spectrum are discussed in the Recreation section of this chapter. Road management objectives, which are called for in the Forest-wide Standards and Guidelines, determine if roads should remain open, seasonally closed, or permanently closed, and what the corresponding benefits and effects on resources re likely to be. Motorized recreation and many subsistence households that prefer using road systems clearly benefit from an open road system. Primitive and semi-primitive non-motorized recreation experiences, wildlife, and subsistence users who prefer a more natural setting benefit from a closed road system. An open road system or access to even a closed road system will generally lead to increased competition between subsistence and sport hunters. Wildlife generally benefits from a closed road system to minimize human/wildlife interaction.

Wilderness and Roadless Areas

The Roadless Areas section of this chapter displays the effects of the expanding road network over time by alternative on inventoried roadless acres and corresponding effects on Wilderness potential. The Forest is currently 83 percent roadless outside of Congressionally-designated Wilderness and LUD II. After the road system is complete (in about 100 years), the Forest under Alternative D (highest number of road miles) would be about 59 percent roadless outside of currently Congressionally-designated Wilderness and LUD II.

Soils

Sediment resulting from road construction and surface erosion during the life of the facility is discussed under the Soils section of this chapter. Best Management Practices are used where appropriate to comply with State Water Quality Standards.

Timber

Increased infrastructure in the form of roads and related facilities enhances the opportunity to provide an economic timber supply. Road costs to the timber purchaser are often approximately the same a logging costs from stump to landing. Obviously, once roads are in place, the adjacent remaining timber stands become much more economic to harvest. Roads also provide an opportunity to quickly salvage disease or pest-damaged timber.

Visual Quality

Cumulative effects of roads and timber harvest over time on the existing visual condition are discussed in the Visual Resource section of this chapter.

Mitigation

Two mitigation measures, applicable to planning, location, design, construction, and maintenance of transportation facilities, are common to all alternatives to ensure maintenance of soil productivity and water quality. The Alaska Regional Guide, which incorporated the Southeast Area Guide, the Tongass Land Management Plan (as amended winter 1985 -'86), and the Forest-wide Transportation Standards and Guidelines in Chapter 4 of the Proposed Revised Forest Plan, provide standards and guidelines and serve as one form of mitigation measure.

Some of the Standards and Guidelines, common to all alternatives, that can be used to reduce or eliminate conflicts include: 1) closing roads seasonally or permanently; 2) incorporating erosion control and stabilization measures for all human-cause soil disturbance; 3) end-hauling excavated waste materials; 4) avoiding locations near fish-bearing streams where feasible; and 5) avoiding areas of important wetland values, floodplains, estuaries, and tidal meadows. For log transfer facility siting: 1) normally prohibiting sites near rearing and spawning areas; 2) considering bark dispersal and intertidal and subtidal productivity; and 3) avoiding bald eagle nest trees.

The second mitigation measure is recommended Best Management Practices (BMP's). BMP's are land management methods, measures, or practices intended to minimize or reduce water pollution and are used to comply with State Water Quality Standards. Twenty-five BMP's have been developed specifically for transportation facilities. These twenty-five BMP's are listed in the Soil and Water Conservation Handbook (FSH 2509.22 (2/91), Chapter 14) which is incorporated here by reference and may also be found in Appendix C of the Proposed Revised Forest Plan.

In addition, a monitoring plan is included in Chapter 6 of the Proposed Revised Forest Plan to provide methods to assess whether goals are being accomplished.

Visual Resource

Affected Environment

Changes Since the DEIS

Since the release of the DEIS (June 1990), the Stikine and Ketchikan Areas have updated their Existing Visual Condition inventories to reflect management activities which occurred over the 1990-1991 operating season. These activities include: timber harvest, road construction, recreation development, and wildlife and fisheries improvement projects. The Tongass Timber Reform Act legislated additional Wilderness and roadless areas (LUD II), increasing the lands that will retain their scenic values through Congressional designations by 1.018 million acres.

Background

The Tongass National Forest offers a variety of scenery to its visitors, from spectacular mountain ranges and the glaciers of the mainland to areas managed for timber harvest and a range of recreational opportunities. The unique qualities of Southeast Alaska are evident as one travels through the Tongass.

The Forest is viewed from a variety of vantage points: the communities of Southeast Alaska, the Alaska Marine Highway ferry route, cruiseship routes, existing road systems, popular small boat routes and anchorages. Developed recreation sites and facilities as well as more remote hiking trails provide another form of visual access to the Forest. Tourist-related "flightseeing" via small aircraft is on the increase and provides aerial views of the forest landscape.

Visual Character of the Forest

The Tongass National Forest is made up of six distinct landscape character types (*Visual Character Types*, 1979). Each type has unique visual characteristics of landform, rock formations, waterforms and vegetative patterns.

Admiralty-Chichagof

In the Admiralty-Chichagof visual character type, landforms are generally rounded, except for mountainous terrain which is rugged and snow-covered most of the year. Rocky islands, reefs and rock bluffs are found frequently on the outer coast of Chichagof Island, the Mitchell Bay and Kootznahoo area and along the southern tip of Admiralty Island. Saltwater bays and estuaries are numerous. Much of this character type exists in a natural-appearing condition.

Small communities such as Hoonah, Tenakee Springs, Pelican, Elfin Cove and Angoon are located within this character type. The West Chichigof-Yakobi Wilderness and the Admiralty National Monument are located here as well. Timber harvest activities are presently occurring on Chichagof Island from Icy Strait to Peril Strait on both private and National Forest lands. Mining operations are occurring on public lands, and timber harvest on private lands, on Admiralty Island.

Kupreanof Lowland

The Kupreanof Lowland visual character type encompasses the central portion of the Inside Passage, including the Wrangell Narrows; Chatham, Sumner and Stikine Straits; Duncan Canal; Salmon Bay Lake and Frederick Sound. The area is made up of islands with rolling terrain and topographical relief varying from 300 to 1,500 feet, and is separated by an intricate network of waterways. Mountains are scattered and block-like, rising to 3,500 feet above the lowlands. The shoreline is made up of many small bays, rock reefs, and occasional small gravel beaches. The spruce/hemlock forest dominates this character type, except for areas of higher elevations where alpine ecosystems are present.

The communities of Kake, Rowan Bay, Port Protection, Point Baker as well as the Tebenkof Bay, Kuiu and Petersburg-Duncan Salt Chuck Wildernesses are within this character type. The

southern portions of Kuiu and Kupreanof Islands, Rocky Pass, and south Lindenburg Peninsula are in a natural condition. The northern portions of Prince of Wales and Kuiu Islands are heavily modified due to timber harvest and road development activities.

Baranof Highland

The Baranof Highland character type reflects the unique qualities of Baranof Island, with elevations reaching 3,000 to 5,000 feet. Shoreline forms are very rugged with steep-sided fiords on both east and west coasts. The Sergius Narrows, Chatham and Peril Straits and the South Baranof Wilderness area are included in this area.

The majority of this character type remains in a natural-appearing condition. The communities of Sitka, Baranof Warm Springs and Port Alexander are located on Baranof Island as well as the South Baranof Wilderness Area. Timber harvest activities have occurred on the northern reaches of Baranof Island from Sitka Sound to Peril Strait to Chatham Strait as well as Kruzof Island.

Cordova-Yakutat

The Cordova-Yakutat visual character type runs east to west, spanning from Yakutat to the Malaspina Glacier to Icy Bay to Cordova. The Chugach Mountains to the north and the Wrangell-St. Elias Mountain Ranges to the south act as visual backdrops to this character type which includes the second tallest peak in North America. The Yakutat Forelands dominate scenes adjacent to Yakutat and Russell Fiords which includes the community of Yakutat.

Past logging activities are evident near Yakutat. Small fish camps are visible along the rivers and beaches. Large expanses of sand beaches stretching for miles make this a unique area on the Tongass. The Russell Fiord Wilderness is in this character type.

Coastal Hill

The southern reaches of the Forest are represented by the Coastal Hill visual character type, whose islands offer an extensive landform variety with elevations ranging from 1000 to 4500 feet. Areas with elevations less than 3500 feet were glaciated and have rounded hummocky summits, knobs and ridges. Marine travel routes of significance include: Clarence, Stikine and Zimovia Straits, Behm Canal and Chomly Sound.

The communities of Wrangell, Petersburg, Thorne Bay, Ketchikan, Craig, Klawock and Hydaburg are within this character type. The area is substantially developed, with timber harvest activities evident on central Prince of Wales Island, north and central Revilla Island, Mitkof, Wrangell, Deer and north Etolin Islands. The Alaska Marine Highway (ferry) and cruiseship traffic pass through this area.

Coast-Range

The Coast-Range visual character type encompasses the mainland from Dixon Entrance to the south and Lynn Canal to the north. The scale of the landforms is large and massive, generally ranging from 5000 to 7000 feet in elevation, with occasional rock formations reaching to 9000 feet. Geologic features abound in this character type—cliffs, rock escarpments with jagged peaks, and spires at higher elevations. Glacial streams are generally braided, and originate in British Columbia.

This character type offers numerous opportunities to view spectacular scenery, and includes the Stikine-LeConte, Endicott River, and Tracy Arm-Fords Terror Wilderness Areas; Misty Fiords National Monument; and the communities of Juneau, Skagway, and Haines. The majority of

this character type is natural-appearing, however, there is evidence of past and current mining and timber harvest on both private and public lands. Significant travel routes of interest are: Frederick Sound, Stephens Passage, Lynn Canal (north to Skagway), the Eastern Passage/Back Channel and Behm Canal. Commercial sightseeing ventures are promoting the scenic attractions found in this area.

Visual Condition of the Forest

The visual condition of the Tongass varies by location and is dependent on a variety of factors. In addition to the variety of natural aspects of the visual resource (geology, vegetation, waterforms, etc.), visible, human-made developments affect the visual condition of some areas. These developments include roads, rock quarry sites, timber harvest, log transfer facilities, hydroelectric powerline clearings, recreation facilities, fish improvement projects, mariculture operations, and mining developments. Development activities on National Forest lands are concentrated mostly in areas near the communities of Petersburg, Wrangell, Ketchikan, Hoonah, Sitka and Juneau.

Management of lands adjacent to the National Forest (State and private lands) has also affected the visual setting of Southeast Alaska. Timber harvest activities on Native Corporation and State lands, and their associated development, are changing the appearance of parts of Southeast Alaska from a predominantly natural-appearing setting to a more developed and altered visual condition.

Table 3-147 illustrates the existing visual condition of the Forest as seen from the Alaska Marine Highway, currently used recreation places, and primary (Sensitivity Level 1) and secondary (Sensitivity Level 2) travel routes and use areas.

Table 3-147
Existing Visual Condition (EVC)

EVC Rating[1]	Type I	Type II	Type III	Type IV	Type V	Type VI
Forest-wide (excluding Wilderness)[2]						
Sensitivity Level 1 Travel Routes and Use Areas						
Seen	3,017,507	24,190	72,195	111,360	260,488	20,732
Unseen	0	0	0	140	0	0
Sensitivity Level 2 Travel Routes and Use Areas						
Seen	1,258,145	6,353	36,950	96,301	216,353	23,119
Unseen	23,497	0	0	40	1,521	662
Sensitivity Level 3 Travel Routes and Use Areas						
Seen	8,033	0	80	10,208	0	0
Unseen	5,287,166	3,439	16,558	136,716	452,395	37,713
Alaska Marine Highway Travel Route[3]						
Seen	886,746	6,304	13,928	41,021	140,200	14,380
Unseen	473,105	781	1,177	14,941	79,915	8,782
Recreation Places (excluding Wilderness)[4]						
Seen	1,596,030	22,780	54,390	79,240	220,550	17,340
Unseen	869,780	2,360	8,720	31,950	94,360	2,620
EVC by Administrative Area[5]						
Chatham Area						
Seen	2,697,920	21,400	19,770	58,300	204,880	16,120
Unseen	2,247,980	6,020	16,310	32,370	74,010	16,620
Stikine Area						
Seen	828,260	8,200	32,850	62,770	185,630	0
Unseen	1,556,800	2,420	12,170	48,900	193,420	0
Ketchikan Area						
Seen	795,200	4,460	57,550	97,020	86,370	27,740
Unseen	1,515,031	940	2,990	74,700	193,910	37,520

Definitions of the Existing Visual Condition Types are:

Type I: Areas are untouched by human activities.

Type II: Changes in the landscape are not visually evident.

Type III: Changes in the landscape may be noticed by the casual forest visitor.

Type IV: Changes in the landscape are easily noticed by the casual forest visitor.

Type V: Changes in the landscape are strong and obvious to the casual forest visitor.

Type VI: Changes in the landscape are in glaring contrast to the natural forest appearance.

[2] Source: Q53A

[3] Source: Q53

[4] Source: Q48C

[5] Source: Q48

Visual Management System

The Forest Service has developed the Visual Management System as a framework for inventorying scenic resources and providing measurable standards for their management. The components of this system are sensitivity levels, variety classes and distance zones.

Sensitivity Levels

Sensitivity levels provide a method to measure the importance of viewed landscapes, and reflect concerns of person(s) viewing the landscape. On the Tongass, Sensitivity Level 1 areas are typically high use roads or trails, the Alaska Marine Highway, cruiseship routes, highly-used marine travel routes, campgrounds, or developed recreation sites visited by persons with a moderate to high degree of concern for scenic quality. Sensitivity Level 2 travel routes or use areas are those which receive less use, with the viewer having a moderate degree of concern for visual quality. Sensitivity Level 3 areas are not seen from any of the above areas and receive the least use along travel routes or other areas.

The Sensitivity Level mapping was completed in 1980 and approved by the Regional Forester. As a result of project planning and implementation (such as new road or recreation site construction) updating has occurred and is reflected in the current inventory used for the Revision.

Variety Classes

The six Visual Character Types on the Tongass provide a frame of reference for the variety class inventory. Each character type has unique features, many of which increase the scenic quality and interest of the area. Class A landscapes have outstanding or unusual features of landform, vegetative patterns, waterforms or geologic features. Class B landscapes are common throughout the character type with no outstanding features. Class C landscapes have minimal variety in form, line, color or texture.

Distance Zones

The third step in the inventory process is the distance zone mapping. Foreground areas are those seen from the viewer to one-quarter mile away. Middleground areas are seen from one-quarter mile to three to five miles. Background areas are those seen from three miles to infinity.

Visual Quality Objectives

These three elements: Sensitivity Levels, Variety Classes and Distance Zones, are then combined to form Inventory Visual Quality Objectives (VQO's) which are: Preservation, Retention, Partial Retention, Modification and Maximum Modification. Visual Quality Objectives provide measurable standards or objectives for managing the visual resource and are based on public desires for scenic quality (sensitivity levels), the diversity of natural features in the landscape (variety class), and the distance from which the landscape is seen (distance zones). The Preservation Visual Quality Objective is assigned to Wilderness and provides for ecological change only, with low impact recreational facilities allowed. Table 3-148 illustrates the current inventory by travel route and use area characteristics, and defines the four VQO's other than Preservation. Figure 3-45 shows an illustration of the four objectives.

VQO's have been integrated into the management prescriptions for each of the land use designations, and will be adopted with the implementation of the revised Forest Plan. The Adopted VQO's will provide the project-level interdisciplinary team specific visual objectives to be achieved during project implementation.

Table 3-148
Visual Quality Objectives

Inventory Visual Quality Objectives[1]	Retention	Partial Retention	Modification	Maximum Modification
Forest-wide (excluding Wilderness)				
Sensitivity Level 1 Travel routes or Use Areas				
Seen	1,632,660	1,824,470	83,040	2,980
Unseen	0	0	60	80
Sensitivity Level 2 Travel routes or Use Areas				
Seen	207,920	613,400	802,760	13,960
Unseen	0	1,300	23,480	940
Sensitivity Level 3 Travel routes or Use Areas				
Seen	20	3,140	13,800	1,360
Unseen	228,050	2,101,300	1,763,650	1,853,340
Alaska Marine Highway Travel route				
Seen	201,655	828,557	252,622	8,287
Unseen	17,735	77,725	357,312	318,448
Recreation Places (excluding Wilderness)				
Seen	733,200	941,710	280,670	5,750
Unseen	70,120	268,600	310,560	363,770
VQO's by Administrative Area (excluding Wilderness)				
Chatham Area				
Seen	1,336,873	1,326,158	351,764	2,799
Unseen	95,703	989,184	1,025,177	225,470
Stikine Area				
Seen	193,929	558,256	346,368	15,263
Unseen	28,109	920,191	278,862	585,150
Ketchikan Area				
Seen	309,791	556,812	201,477	240
Unseen	105,213	193,225	483,145	1,053,145

[1] Definitions of the Visual Quality Objectives are:

Retention: Landscapes in this setting are visually sensitive to change. Activities are designed to not to visually evident to the casual forest visitor.

Partial Retention: Management activities may be evident, but remain visually subordinate to the characteristic landscape.

Modification: This objective provides for management activities which may dominate the characteristic landscape, but borrow from existing form, line, color and texture. The activity appears to be a natural occurrence when viewed as foreground or middleground.

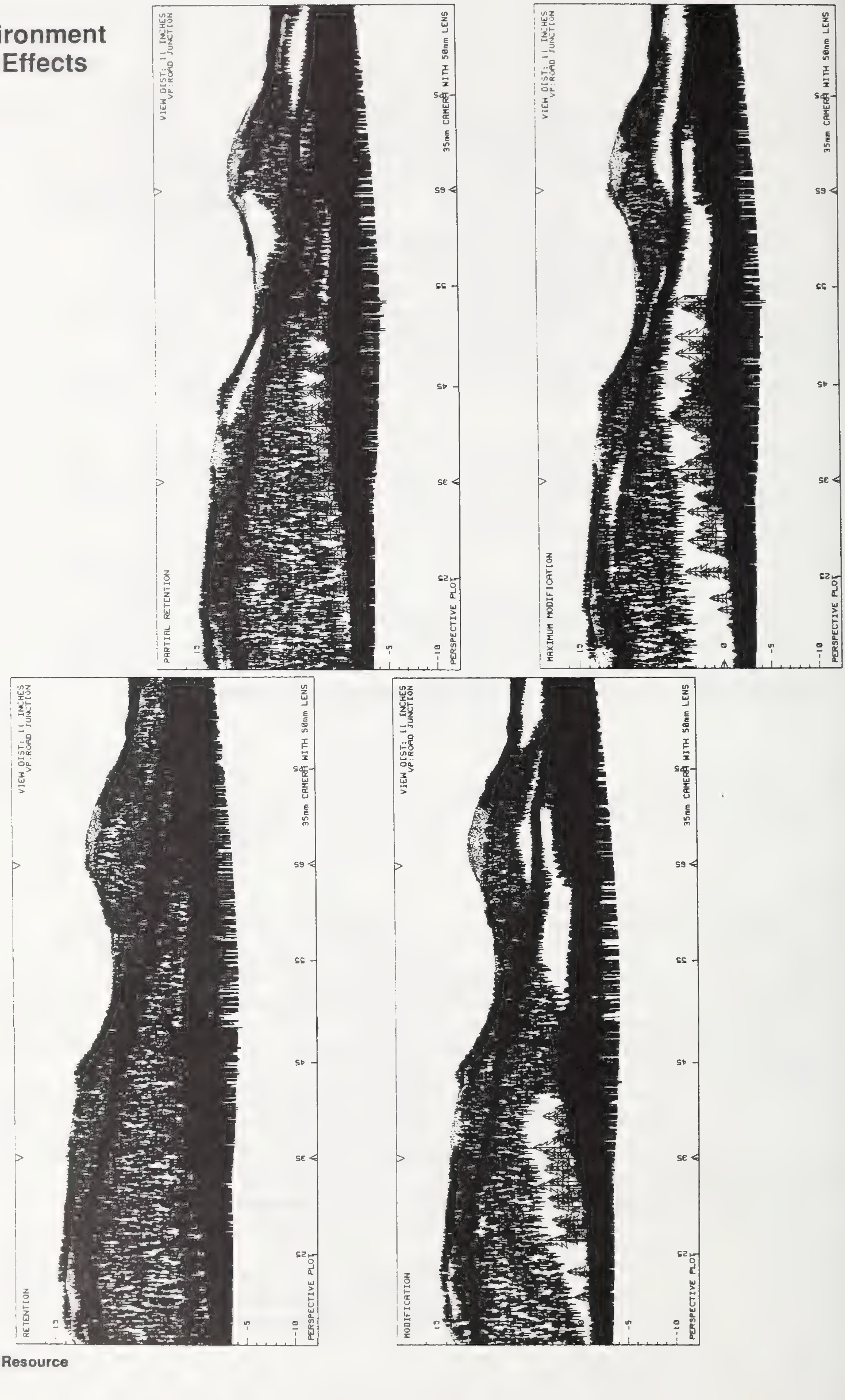
Maximum Modification: Management activities of vegetative and landform alteration may dominate the characteristic landscape. When viewed as background, these activities should appear as natural occurrences within the surrounding area.

[2] Source: Q53B [3] Source: Q47B [4] Source: Q57C [5] Source: Q48

The following illustration (Figure 3-45) is intended to give the reader an idea of the visual condition which could result from projects designed to meet each VQO setting. This is a generic example and is for comparison purposes only.

Figure 3-45

Landscapes as Managed Under the Four Visual Quality Objectives



Visual Absorption Capability

Visual Absorption Capability (VAC) is an estimate of the relative ability of a landscape to absorb or accept management activities (such as timber harvest or road construction) without its visual character being significantly affected. The landscape is evaluated using three mapped items which when combined and analyzed, form areas of High, Intermediate or Low VAC settings. The three mapped items are: slope, variety class and distance zones.

- Slope - Areas of least slope (0-35 percent) are relatively flat to rolling terrain and would indicate the landscape has a high ability to absorb management activities. Slopes of 35 to 65 percent would have a moderate ability (Intermediate VAC) to absorb development and slopes greater than 65 percent a Low VAC rating. In essence, the steeper the terrain; the more difficult it is to incorporate or blend management activities within a landscape.
- Variety Class - describes the degree of landscape complexity within a given area. Class A landscapes reflect a high degree of complexity and interest, Class B a moderate degree and Class C landscapes are common, with no unique features. In the Low VAC setting, the more common the landscape, the more difficult it is for that landscape to absorb management activities.
- Distance zones - indicate the most common position from which a landscape is seen. From the foreground or near distance, a landscape would have a low ability to absorb or accept changes to the landscape. The further away the viewer is from the landscape, the higher its ability to absorb change.

Table 3-149 illustrates the relative percent of the tentatively suitable forest land by VAC setting. It is further broken down by what is seen from each of the three types of travel routes or use areas (Sensitivity Levels 1, 2, 3). For example, 35 percent of the tentatively suitable lands, seen from the most sensitive travel route (SL 1) have a Low VAC rating, where 44 percent of the Moderately sensitive travel routes (SL 2) have a similar rating.

Table 3-149

Visual Absorption Capability ratings of tentatively suitable forest lands as seen from travel routes or use areas.

VAC Rating	Sensitivity Level 1		Sensitivity Level 2		Sensitivity Level 3	
Low	327,980	35%	254,000	44%	1,240	0.1%
Intermediate	490,460	52%	290,300	50%	1,480	0.1%
High	128,080	14%	34,490	6%	1,010,710	98.8%

Source: Q1018 Tongass Revision Data base May 6, 1991

Current Forest Plan Guidance

The Tongass Land Management Plan provides for viewing scenery in its natural condition through the allocation of LUD I areas (Wilderness Areas), LUD II areas (where timber harvest and most roads are not allowed), and LUD III "Special areas" adjacent to many Southeast Alaskan communities (where timber harvest has been reduced because of other resource users.) In other areas designated LUD IV, an extended rotation of 200 years is provided for regenerating timber stands in areas of high visual sensitivity in some cases. LUD IV recognizes areas of high visual sensitivity with a 120-year rotation, and areas of medium visual sensitivity with five percent retention. Areas of extended rotation were intended to increase the time frame for harvesting in a particular landform. The normal rotation period is 80 to 100 years (Tongass Evaluation Report, Appendix A, November 1984).

The 1979 Forest Plan provides broad direction for each of the 141 management areas it established and, in some cases, describes appropriate Visual Quality Objectives (VQO's) for specific areas within each management area. The 1979 Tongass Land Management Plan was completed prior to completion of the Visual Quality Objectives inventory. So, although VQO's were part of the direction, they were not based on any formal inventory implemented according to Regional or National guidelines. The revised Forest Plan will adopt Visual Quality Objectives through the land allocation process. These will be implemented through standards and guidelines.

Scenic Potential

The Tongass Timber Reform Act (TTRA) created six new Wilderness areas, increasing the total Wilderness from 5.4 to 5.8 million acres, or 34 percent of the Forest land base. This legislation also mandated that 12 areas be allocated Land Use Designation II (LUD II) (717,930 acres). The intent of this allocation is to maintain these areas in their roadless, pristine condition through perpetuity. All these legislated conditions provide a means for ensuring the preservation of scenic landscapes in these areas. However, many of these areas are located away from the readily accessible marine-related areas adjacent to communities, the Alaska Marine Highway, and the more heavily used small boat routes.

Of the most critical landscapes (Sensitivity Level 1) which are presently roadless, 27 percent are within areas considered tentatively suitable for timber harvest; 15 percent of Sensitivity Level 2 roadless landscapes are tentatively suitable. (Source: Tongass Revision Data base, Q52 May 6, 1991)

Scenic potential may also include an increased ability to view landscapes which are currently inaccessible. New roads adjoining communities, new trails, and increased cruiseship operations provide greater opportunities to view the Tongass.

Scenic Byway Program

In 1988, the Forest Service initiated a program to designate scenic travel routes providing access within National Forests as Scenic Byways. The Scenic Byways Program identifies and designates the most scenic stretches of these travel routes for visitors to enjoy, emphasizing interpretation of Forest activities and partnerships with other organizations. The intent of a National Forest Scenic Byway is to provide the traveler with outstanding scenery in harmony with Forest management activities. It can reflect a high quality yet "managed" and changing Forest landscape. Through this program, the Forest Service hopes to showcase both the beauty and multiple-use aspects of the 156 National Forests in the United States.

The Alaska Marine Highway provides access to the communities of Southeast Alaska from Bellingham, Washington, and Prince Rupert, British Columbia to Ketchikan and through Southeast Alaska to as far north as Skagway and west to Sitka. It is a "highway" in the sense that it is designed to provide an automobile travel link by ferry from the Lower 48 States to and through Alaska. The Marine Highway serves the communities of Southeast Alaska in the same way that land-based roads do elsewhere. The State ferry system is widely used by tour groups and independent travelers to view the unique scenery of Southeast Alaska.

With this in mind, all or portions of, the Alaska Marine Highway could be nominated as a National Forest Scenic Byway. At present, the Forest Service, Alaska Region, is pursuing nomination as a Scenic Byway for the Alaska Marine Highway separate from the Forest Planning process.

Demand for Scenic Quality

Demand for scenic quality can best be represented by the increase in tourist-related travel to the Tongass, as well as a heightened awareness and sensitivity of Alaskan residents to scenic resource values. From 1979 to 1989, cruiseship visitation increased from 46,000 passengers to over 200,000 passengers and ferry system use increased from about 250,000 passengers to 343,000 passengers.

Southeast Alaska's Inside Passage is advertised and promoted by the Division of Tourism, cruiseship operators, and the Southeast Alaska Tourism Council. Their marketing strategy focuses on the scenery of the Tongass National Forest as a major attraction. Visitors to Southeast Alaska would, therefore, arrive with expectations and an image of the environment and scenery awaiting them. "The current trend in both State and private industry advertisements capitalize on the scenic splendor of the state, particularly Southeast" (Bright, 1985).

One of the most important findings of the Alaska Public Survey was "the importance of the Region's natural resource base in providing an attractive setting in which to live and recreate. For many, the importance attached to, and satisfaction derived from, the region's environmental setting overshadowed the economic opportunities that the natural resource provided."

If current trends continue, demand for viewing scenic landscapes will increase. Lands adjacent to the Alaska Marine Highway, cruiseship routes, small plane/flightseeing routes, high-use recreation areas, and other marine and land-based travel routes will be seen by more people, more frequently, and for greater durations.

Methodology and Scientific Accuracy

The process of implementing the National Forest Visual Management System (USDA Handbook 462, page 18) requires a measurement of "people's concern for the scenic quality of National Forests". As mentioned previously in the discussion of Sensitivity Levels, a judgment was made as to the degree of public expectation for the scenic quality of landscapes seen from marine travelways and use areas on National Forest lands. This assessment provides the basis for the sensitivity level ratings, which is one of three elements used in deriving Inventory VQO's. However, these ratings have never been validated by the public. Through public scoping we are able to determine specific areas that are significant to the public, however, a study is needed to validate these assumptions.

There is some degree of uncertainty in the consistency of applying the Visual Management System (VMS) on the three Administrative Areas. Through working together, the Landscape Architects on the Tongass strive to apply the VMS in a professional and consistent manner, following guidelines found in the manuals and USDA Handbooks.

Visual Resource

Environmental Consequences

Each of the alternatives, if implemented, would maintain, alter or enhance the visual character of the landscapes on the Tongass to varying degrees. Visual Quality Objectives (VQO's) and Existing Visual Condition (EVC) types have been used to describe the future visual condition of the Forest which could be expected with the implementation of the five alternatives. The terms are identical to those used previously in the discussion of the EVC inventory, which describe the current appearance of the Forest.

The most obvious and significant effects on the visual resource are from vegetation and landform alterations typically associated with resource management activities such as timber harvest, road construction, recreation facility development and mineral exploration and development.

It should be noted that the visual effects of timber harvest activities are not limited to the activity alone. The harvest activity, as seen from a travel route or use area, affects the visual appearance of the entire landscape visible from that route or area. For these reasons, the quantifiable visual effects are greater than the acres of tentatively suitable forest land.

Effects of the Alternatives

Alternative A

This alternative provides protection and mitigation for many of the scenic landscapes on the Tongass, maintaining almost 81 percent of the Forest through the allocation of 7.8 million acres to natural setting land use designations as well as areas currently designated as Wilderness (5.8 million acres). Nineteen percent (3.2 million acres) is allocated to prescriptions which provide for varying degrees of timber harvest. Of this area, 28.3 percent is allocated to Scenic Viewshed, 36.4 percent to Modified Landscape and 25.3 percent to Timber Production. The remaining 10 percent is within the Stream and Lake Protection designation. (Source: TLMP Revision Data base: Q: RxFinal, May 6, 1991)

This alternative has the lowest allowable sale quantity of all alternatives (298.8 MMBF) and the greatest allocation of the Scenic Viewshed land use designation. Views from the ferry lane, recreation places and areas adjacent to communities will have the greatest degree of protection. This is not to imply that the landscapes will remain the same. Change will occur, but will be compatible with elements found in the characteristic landscape and will not dominate the seen area.

Table 3-150 illustrates the assigned VQO's by distance zone and their distribution. Most areas seen in the foreground and middleground distances will not be dominated by timber harvest and related activities. Ninety-seven percent of the Maximum Modification areas are allocated to areas not seen from a sensitive travel route or use area.

Table 3-150

Alternative A visual quality objectives by distance zone[1]

Distance Zone	Retention	Partial Retention	Modification	Maximum Modification
Foreground	614,399	505,312	300	660
Middleground	1,633,765	1,733,866	340	13,613
Background	329,160	284,903	120	8,678
Not Seen	3,519,617	972,797	817,275	827,327

Source: Revision Data base Q47D1, June 6, 1991

[1] Does not include the 5.8 million acres of Wilderness, which contributes to maintaining natural scenic landscapes.

Alternative B

This alternative provides the second highest degree of protection for natural landscapes on the Tongass. About 42 percent of the Forest would be allocated to natural-setting LUD's and almost 35 percent is within designated Wilderness. Twenty-three percent (3.9 million acres) of the Forest) is allocated to LUD's which provide for varying degrees of timber harvest. Of this area, 25.6 percent is allocated to Scenic Viewshed, 17.7 percent to Modified Landscape and 46.6 percent to Timber Production. This is in sharp contrast to Alternative A. Many of the areas allocated to Modified Landscape in Alternative A have shifted to Timber Production in Alternative B. The remaining 10.1 percent is within the Stream and Lake Protection designation. (Source: TLMP Revision Data base: Q: RxFinal, May 6, 1991)

The Timber Production LUD is allocated to areas currently under intensive management (as in the long-term sale areas on Prince of Wales Island, Kuiu Island, Cleveland Peninsula, etc.) and would result in a highly modified environment. Table 3-151 illustrates the shift in allocation of the Modification VQO (from the Modified Landscape LUD). Some foreground areas in less sensitive areas would also be affected by the activities allowed in the Modification VQO setting.

Table 3-151

Alternative B visual quality objectives by distance zone[1]

Distance Zone	Retention	Partial Retention	Modification	Maximum Modification
Foreground	542,809	499,039	9,814	79,491
Middleground	1,395,774	1,670,733	480	317,060
Background	268,881	321,387	579	33,155
Not Seen	3,232,836	886,256	588,638	1,430,872

Source: Revision Data base Q47D1, June 6, 1991

[1] Does not include the 5.8 million acres of Wilderness, which contributes to maintaining natural scenic landscapes.

Alternative C

Representing the 1979 Forest Plan, this alternative provides for mitigation of visual resource concerns adjacent to communities through the application of the Scenic Viewshed and Modified Landscape designations to areas currently allocated to LUD III. However, to meet the ASQ and the continued timber supply to long-term sale contracts, the visual appearance of landscapes in areas currently allocated LUD IV would be dominated by harvest activities.

Wilderness and natural setting allocations represent 66 percent of the Forest in this alternative. The remaining 34 percent (or 5.76 million acres) of the Forest will be expected to generate the allowable sale quantity of 450.9 million board feet. Of those 5.76 million acres, 11.8 percent is allocated to Scenic Viewshed in foreground areas primarily, 23 percent to Modified Landscape (middle to background distance as seen from the ferry lane), and 54.7 percent to Timber Production. The remaining 10.5 percent is within the Stream and Lake Protection designation. (Source: TLMP Revision Data base: Q: RxFinal, May 6, 1991)

As can be interpreted from Table 3-152, most of the foreground areas of the Forest will be managed for the Retention or Partial Retention objectives. However, these objectives are primarily applied to areas which are currently allocated LUD III. Areas allocated LUD IV and outside the community home range, will appear heavily modified by timber harvest and related activities. Of the areas allocated to Maximum Modification, almost 27 percent is within the middleground seen areas.

Table 3-152

Alternative C visual quality objectives by distance zone[1]

Distance Zone	Retention	Partial Retention	Modification	Maximum Modification
Foreground	596,968	335,849	84,061	125,361
Middleground	1,313,721	1,257,620	340	821,093
Background	260,348	184,613	120	179,242
Not Seen	2,853,892	431,589	924,308	1,947,215

Source: Revision Data base Q47D1, June 6, 1991

[1] Does not include the 5.8 million acres of Wilderness, which contributes to maintaining natural scenic landscapes.

Alternative D

With the implementation of this alternative (see Table 3-153), the Forest visitor could expect to see a highly modified environment in all distance zones. Having the highest allowable sale quantity (472.1 million board feet), this alternative provides the least mitigation for visual resource concerns. This alternative provides the least of Scenic Viewshed, Modified Landscape, and allocations in the natural setting range.

Approximately 42 percent of the Forest would be allocated to natural setting LUD's and almost 35 percent is within designated Wilderness. Twenty-three percent of the Forest (or 3.9 million acres) is allocated to LUD's which provide for varying degrees of timber harvest. Of this area, 25.6 percent is allocated to Scenic Viewshed, 17.7 percent to Modified Landscape and 46.6 percent to Timber Production. The remaining 10.1 percent is within the Fish Habitat and Water Quality Requirements designation. (Source: TLMP Revision Data base: Q: RxFinal, May 6, 1991.)

Table 3-153

Alternative D visual quality objectives by distance zone[1]

Distance Zone	Retention	Partial Retention	Modification	Maximum Modification
Foreground	262,689	481,138	158,554	235,079
Middleground	930,738	1,186,793	46,022	1,225,420
Background	164,507	225,077	13,574	221,224
Not Seen	1,532,986	1,826,622	442,869	2,343,489

Source: Revision Data base Q47D1, June 6, 91

[1] Does not include the 5.8 million acres of Wilderness, which contributes to maintaining natural scenic landscapes.

Alternative P

Alternative P (see Table 3-154) provides the third highest ASQ (418.2 MMBF) of the five alternatives. Lands designated LUD IV in the 1979 Forest Plan will maintain a commodity emphasis by being designated Timber Production. Scenic Viewshed and Modified Landscape allocations are primarily located in areas visible from sensitive travel routes and use areas. In areas outside the ferry lane and community home range areas, the Timber Production designation is dominant. Back bays and lesser used areas allocated to this land use designation will appear substantially altered by timber harvest and related activities (EVC Type V and VI).

Thirty-four percent of the Forest would be allocated to natural setting land use designations and 35 percent in designated Wilderness. Approximately 5.2 million acres (or 31 percent of the Forest) is allocated to LUD's which provide for varying degrees of timber harvest. Of this area, 17.4 percent is allocated to Scenic Viewshed, 24.8 percent to Modified Landscape and 47.3 percent to Timber Production. The remaining 10.5 percent is within the Stream and Lake Protection designation. (Source: TLMP Revision Data base: Q: RxFinal, June 6, 1991)

Table 3-154

Alternative P visual quality objectives by distance zone[1]

Distance Zone	Retention	Partial Retention	Modification	Maximum Modification
Foreground	576,435	413,000	48,489	93,804
Middleground	1,253,722	1,455,604	26,884	650,561
Background	244,165	211,475	120	168,444
Not Seen	2,536,596	1,012,192	1,065,744	1,533,625

Source: Revision Data base Q47D1, June 6, 1991

[1] Does not include the 5.8 million acres of Wilderness, which contributes to maintaining natural scenic landscapes.

Direct, Indirect and Cumulative Effects

Analysis by Significant Travel Routes

In the description of each Landscape Character Type, travel routes of high use and visual sensitivity were noted. Table 3-155 includes the acres seen from each of those travel routes, using Inventory Visual Quality Objectives as a benchmark. The degree of change which could occur with implementation of each alternative is indicated by the VQO's assigned by that alternative.

Based on the themes of the alternatives, and the resulting land use allocations, it is not surprising to see areas with the objectives of Retention and Partial Retention in Alternatives A and B, assigned the more development-oriented VQO's of Modification and Maximum Modification in Alternatives C and D. Alternative P provides a compromise between the more restrictive allocations of Alternatives A and B, and the commodity focus of Alternative C and D. (Source: TLMP Revision Data base: Q47F, June 6, 1991).

Table 3-155

Potential visual effects on areas seen from travel routes, by alternative[1]

Travel Route Viewshed Name	Inventory VQO	A	B	Alternative C	D	P
Behm Canal						
Retention	3,564	2,705	3,446	3,285	140	2,284
Partial Retention	6,269	7,129	6,389	3,705	480	6,468
Modification	0	0	0	413,306	3,306	0
Maximum Modification	0	0	0	2,404	5,909	1,082
Chatham Strait						
Retention	4,954	10,089	8,468	9,867	460	10,047
Partial Retention	34,620	35,524	37,104	10,426	8,990	17,519
Modification	6,038	0	20	1,060	2,077	780
Maximum Modification	0	0	20	24,259	34,084	17,266
Cholmondeley Sound						
Retention	942	2,326	2,326	642	1,121	702
Partial Retention	2,286	902	862	2,366	160	2,366
Modification	0	0	0	60	502	0
Maximum Modification	0	0	40	161	1,445	161
Clarence Strait						
Retention	10,194	14,280	14,183	15,770	5,667	15,449
Partial Retention	34,004	29,800	29,757	17,713	9,110	22,821
Modification	61	20	20	1,361	8,246	901
Maximum Modification	81	240	380	9,496	21,316	5,169
Duncan Canal						
Retention	2,718	1,179	1,939	2,058	60	1,499
Partial Retention	7,595	9,313	8,513	3,618	1,419	4,177
Modification	180	0	0	699	1,879	699
Maximum Modification	0	0	40	4,117	7,136	4,117
Eastern Passage						
Retention	6,321	6,281	4,421	4,481	540	4,101
Partial Retention	19,965	20,004	21,585	13,644	11,623	17,504
Modification	0	0	0	2,120	3,280	800
Maximum Modification	0	0	280	6,041	10,842	3,881
Ernest Sound						
Retention	420	2,320	379	719	0	719
Partial Retention	3,740	1,990	3,620	2,340	2,420	2,340
Modification	160	0	0	0	140	0
Maximum Modification	0	0	320	1,259	1,759	1,259
Frederick Sound						
Retention	1,599	5,456	4,538	4,217	937	4,177
Partial Retention	24,911	24,706	24,226	7,448	4,428	8,726
Modification	3,672	0	0	80	2,359	80
Maximum Modification	160	180	1,576	18,598	22,618	17,358
Hyder/Salmon River Highway						
Retention	4,121	260	360	1,140	720	3,861
Partial Retention	1,900	5,761	5,661	4,881	5,301	2,160
Modification	0	0	0	0	0	0
Maximum Modification	0	0	0	0	0	0
Icy Strait						
Retention	1,780	6,047	740	2,142	20	1,721
Partial Retention	19,888	16,981	22,288	9,599	21,248	13,483
Modification	1,360	0	0	460	0	20
Maximum Modification	0	0	0	10,828	1,760	7,804
Lynn Canal to Skagway						
Retention	14,308	21,845	4,040	7,139	2,779	6,697
Partial Retention	31,414	24,056	41,863	38,782	41,055	39,224
Modification	200	20	0	0	99	0
Maximum Modification	0	0	20	0	1,989	0

Table 3-155 (continued)

Travel Route Viewshed Name	Inventory VQO	A	B	Alternative C	D	P
Mendenhall Visitor Center						
Retention	3,779	6,304	1,039	1,019	1,998	1,039
Partial Retention	2,984	460	5,724	5,744	4,765	5,724
Modification	0	0	0	0	0	0
Maximum Modification	0	0	0	0	0	0
Peril Strait to Sitka						
Retention	4,681	16,985	14,358	17,441	1,160	22,780
Partial Retention	56,494	47,791	48,494	27,675	12,599	21,262
Modification	3,641	0	160	140	6,678	140
Maximum Modification	0	40	1,804	19,559	44,378	20,635
Salmon Bay Lake						
Retention	0	0	0	20	0	20
Partial Retention	1,538	1,755	1,799	1,775	20	1,775
Modification	257	0	0	0	120	0
Maximum Modification	0	40	40	0	1,655	0
Stephens Passage						
Retention	11,028	9,844	7,810	9,453	1,818	9,730
Partial Retention	41,037	43,243	45,256	32,677	26,344	32,361
Modification	1,062	0	0	500	2,835	500
Maximum Modification	0	40	60	10,495	22,129	10,535
Stikine Strait						
Retention	843	2,725	2,725	4,068	280	4,068
Partial Retention	23,641	21,738	21,738	20,416	22,885	20,416
Modification	0	0	0	0	100	0
Maximum Modification	0	20	20	0	1218	0
Sumner Strait						
Retention	4,075	8,843	9,727	10,804	220	11,081
Partial Retention	32,619	28,267	23,669	11,165	10,340	13,230
Modification	577	20	2,497	3,454	8,211	2,715
Maximum Modification	0	140	1,379	11,849	18,499	10,245
Sweetwater Lake/Honker Divide/Three Lakes						
Retention	5,120	3,580	2,340	3,420	500	1,699
Partial Retention	7,801	9,180	8,360	6,641	2,700	10,102
Modification	0	0	600	680	3,220	600
Maximum Modification	0	160	1,620	2,180	6,501	520
Tenakee Inlet						
Retention	1,639	7,436	2,099	6,275	740	3,736
Partial Retention	14,691	12,189	17,527	5,080	11,134	7,618
Modification	3,336	0	0	0	200	0
Maximum Modification	0	40	40	8,311	7,593	8,312
West Coast Waterway						
Retention	8,462	6,276	6,057	6,219	0	5,599
Partial Retention	11,297	13,423	12,280	500	1,602	2,265
Modification	0	40	220	2,258	5,934	1,959
Maximum Modification	0	0	1,202	10,780	12,222	9,938
Wrangell Narrows						
Retention	5,662	8,982	6,282	4,321	901	5,982
Partial Retention	13,702	11,202	13,903	18,863	16,345	14,202
Modification	60	20	20	20	660	20
Maximum Modification	781	0	0	0	2,299	0
Zimovia Strait						
Retention	4,602	6,062	3,240	2,800	340	4,060
Partial Retention	13,441	12,000	14,823	9,760	6,382	13,363
Modification	40	20	20	280	2,559	20
Maximum Modification	0	0	0	5,243	8,801	640

[1] Based on acres of Visual Quality Objectives assigned by alternative.

Future Visual Condition

Table 3-156 displays the future visual condition of the Forest by alternative. The far left column describes the current Existing Visual Condition (EVC) inventory in acres of Type I through VI, providing the reader a basis for comparison of the alternatives.

As defined earlier, an EVC Type I rating applies to those lands where only ecological change has occurred, EVC Type IV describes those landscapes where change is strong and obvious to the visitor, and EVC Type VI applies to those areas where change is in glaring contrast to the landscape's natural appearance.

This table illustrates the relationship of the Forest's current visual condition to the resulting future visual condition by alternative. It should be noted that visual effects measured by the Existing Visual Condition may significantly exceed the number of acres directly modified, since what is being measured is the apparent disturbance in an entire landscape or scene, not just the actual acres harvested.

Across the top of each chart are the Future Visual Condition types which would result from the implementation of a specific alternative over time (several decades). For example, in Alternative A, 15,315,060 acres are currently in a pristine visual condition (Type I), and with the implementation of this alternative the visual condition of 539,433 acres would be subject to disturbance (Type VI) as suitable forest lands are harvested. In comparison, 1.78 million acres (which are currently in a pristine condition) would appear in glaring contrast to the natural landscape (Type VI) with the implementation of Alternative P. Alternative D would have the greatest impact on unmanaged areas, with over 3 million acres being affected by activities meeting the Type VI rating criteria.

Table 3-156

Future visual condition compared to the current visual condition (excluding Wilderness)

Existing Condition	Visual Acres	Future Visual Condition Type Type I	Type II	Type III	Type IV	Type V	Type VI
Alternative A							
Type I	9,584,868	62,596	5,676,248	2,669,500	179,134	521,988	539,433
Type II	33,982	260	12,423	20,280	60	560	459
Type III	127,343	340	36,883	82,388	6,966	1,861	4,532
Type IV	354,764	518	80,630	183,553	4,924	32,268	53,931
Type V	933,649	261	164,235	460,542	9,630	110,272	197,339
Type VI	82,964	60	18,960	37,648	40	1,180	25,115
Total	**11,225,605**	**64,035**	**6,023,114**	**2,729,000**	**735,000**	**98,000**	**1,092,000**
Alternative B							
Type I	9,584,868	35,713	5,126,818	2,693,781	228,211	344,581	1,257,524
Type II	33,982	260	9,223	22,800	60	360	1,339
Type III	127,343	300	29,262	66,323	1,661	5,924	24,193
Type IV	354,764	20	58,309	164,868	5,264	19,694	107,649
Type V	933,649	141	95,997	406,861	16,457	37,817	391,833
Type VI	82,964	0	11,275	23,218	1,000	960	47,511
Total	**11,225,605**	**36,433**	**5,369,215**	**3,417,758**	**253,232**	**409,535**	**1,833,292**
Alternative C							
Type I	9,584,868	10,256	4,657,035	1,804,071	213,599	707,711	2,279,343
Type II	33,982	0	10,844	18,101	380	1,760	3,277
Type III	127,343	80	30,266	38,574	1,520	7,737	49,346
Type IV	354,764	40	64,831	88,327	7,907	35,885	161,458
Type V	933,649	141	109,617	236,032	7,385	84,468	502,391
Type VI	82,964	0	5,298	12,820	1,002	7,499	57,347
Total	**11,225,605**	**10,517**	**4,914,302**	**2,231,397**	**233,972**	**845,379**	**3,064,638**
Alternative D							
Type I	9,584,868	25,337	2,838,272	3,168,069	259,414	323,628	3,001,218
Type II	33,982	0	6,188	17,657	180	2,440	7,577
Type III	127,343	320	9,953	38,550	8,048	18,137	56,881
Type IV	354,764	40	25,863	67,781	13,428	23,193	224,700
Type V	933,649	141	38,850	215,302	22,306	40,003	617,985
Type VI	82,964	0	2,939	8,079	2,001	4,618	65,367
Total	**11,225,605**	**25,837**	**2,938,271**	**3,557,544**	**306,898**	**412,219**	**3,996,276**
Alternative P							
Type I	9,584,868	35,520	4,340,015	2,658,103	331,830	643,727	1,781,051
Type II	33,982	260	10,645	20,119	1,300	680	2,279
Type III	127,343	320	33,985	51,002	1,700	5,517	35,178
Type IV	354,764	218	82,322	103,070	11,804	34,420	130,510
Type V	933,649	241	119,428	302,125	40,042	79,357	431,498
Type VI	82,964	60	5,877	21,704	2,561	8,965	46,357
Total	**11,225,605**	**36,679**	**4,624,702**	**3,199,070**	**394,919**	**772,865**	**2,432,918**

Source: TLMP Revision Data base, Q48E, June 6, 1991

The Alaska Marine Highway

As previously discussed, the Alaska Marine Highway provides numerous opportunities for viewing landscapes of the Tongass. The following analysis includes areas seen from the mainline ferry route, which runs from Ketchikan to Skagway, and the side trip to Sitka.

Table 3-157 displays how the areas seen from the this portin of the ferry lane would be managed in terms of Visual Quality Objectives by alternative. Alternatives A and B would provide the greatest protection for the natural-appearing scenic landscapes as viewed from the ferry lane. Almost 100 percent of the seen area would be within areas having Retention or Partial Retention VQO's. In contrast, Alternative D allocates 60 percent of the landscapes to Retention and Partial Retention, and 35 percent to Maximum Modification.

Table 3-157
Visual quality objectives as seen from the Alaska Marine Highway

Assigned VQO	Alt A	Alt B	Alt C	Alt D	Alt P
Retention	323,407	205,897	212,305	95,325	233,267
Partial Retention	604,940	715,751	549,223	461,794	536,090
Modification	160	1,139	4,396	47,658	3,855
Maximum Modification	1,122	8,824	165,727	326,913	158,399

Source: TLMP Revision Data base, Q47D2, June 6, 1991

Alternatives C and P are similar in the treatment of the areas seen from the ferry lane. About 82 percent of the seen area would be assigned to Retention and Partial Retention in either of these two alternatives. Seventeen percent of the travel route would be assigned to Maximum Modification in Alternative P.

Visual Change in Recreation Places

Recreation places are geographical areas which have one or more features that are attractive to persons engaged in recreation activities. They may be lakes or beaches, streamside or roadside areas, trail corridors, cabin sites, campgrounds or other developed recreation sites. For further description, see the discussion in Recreation.

Table 3-158 illustrates the visual quality objectives by alternative that would be applied to inventoried recreation places visible from Sensitivity Level 1 or 2 travel routes or use areas. The chart can be used to measure the degree of visual change that could occur within the recreation places. The visual setting of an area is an important factor which can affect the quality of the recreation experience.

For example, in Alternative A, 937,250 acres would be in a Retention VQO setting (where activities are not evident to the observer). The visual setting of most recreation places would remain unaltered. In contrast, Alternative D provides 477,755 acres of Retention. Alternatives C and D would have the greatest effects on recreation places, with the greatest allocation of Maximum Modification. Alternative P provides a compromise, with more Retention than Alternatives B or D, and less Maximum Modification than Alternatives C or D.

Table 3-158

Visual quality objectives of inventoried recreation places

Assigned VQO	Alt A	Alt B	Alt C	Alt D	Alt P
Retention	937,250	763,605	844,489	477,755	780,655
Partial Retention	1,039,008	1,163,340	764,932	1,042,665	924,215
Modification	400	3,438	46,116	91,633	23,374
Maximum Modification	984	56,701	348,239	383,803	262,198

Source: Revision Data base: Q47D3, June 7, 1991

Relationships with Other Agency Plans or Policies

In some viewsheds there may be differences between Forest Service objectives and those of adjacent landowners or other land management agencies, such as the State of Alaska. The Tongass National Forest coordinates with a number of other agencies to ensure consideration of the visual resource along State and Federal highways and utility corridors and electronics sites. To identify potential conflicts and further coordination between other agencies and the Forest Service, a number of operation and maintenance plans are reviewed, including those of the Army Corps of Engineers, Alaska Power Administration and Alaska Department of Fish and Game.

State of Alaska Marine Park System

AS41.21.300 established Marine Park units of the Alaska State Park system (effective July 16, 1983, and amended July 1, 1986). The primary purposes of the marine park system are to: 1) maintain natural, cultural and scenic values; 2) maintain fish and wildlife resources; and 3) promote and support recreation and tourism in the State.

The alternatives would have differing effects to the lands visible from the Marine Parks. Currently, there are 19 designated parks, 14 of them in Southeast Alaska, ranging from the Chilkat Islands in the north to Dall Island in the south.

Each alternative was evaluated by comparing the land use designations to the objectives of the Marine Park program. Those designations which are compatible with the intent of the program are: Scenic Viewshed, Primitive Recreation, Semi-Primitive Recreation, LUD II, Beach Fringe and Estuary, Old-Growth Habitat, Stream and Lake Protection and Wilderness. Overall, Alternatives A, B and P would have a moderate to high probability of being consistent with the purposes of the marine park program. During the evaluation, the compatible land use designations were found to be adjacent to most of the established marine parks.

Alternatives C and D provide for management activities which may not be consistent with the intent of the Marine Park program (e.g., Timber Production and Modified Landscape designations). In comparing the alternatives, the allocations associated with Alternative A would provide management compatible with almost 100 percent of the designated parks, Alternative B: 86 percent, Alternative C: 50 percent, Alternative D: 57 percent and Alternative P: 71 percent.

Mitigation

The appearance of the landscape will change as management activities are implemented to fulfill Plan objectives. Several published visual resource handbook guides, such as *National Forest Landscape Management, Volumes 1 and 2*, specify mitigation methods for the visual resource to be considered and implemented during site-specific project analysis.

In all alternatives, Forest-wide Standards and Guidelines for Visual Quality (see Proposed Revised Forest Plan, Chapter 4) will be applied to activities consistent with the objectives of each land use prescription. Where land- or vegetation-altering activities need to be planned and conducted to meet visual quality objectives, LUD's (such as Scenic Viewshed) which emphasize scenic quality are applied. This, of course, varies by alternative.

Water

Affected Environment

Changes Since the DEIS

The discussion on riparian conditions has been revised to reflect changes brought about by the Tongass Timber Reform Act. A section on scientific methodology has been added. Geozones are no longer being used to estimate effects.

Background

The Tongass National Forest is characterized by an abundance of water. Great quantities of water fall, primarily as rain, at the lower elevations and snow at the higher elevations. Much of the snow builds into glaciers which cover portions of the coastal mainland. The Tongass is influenced by the oceans and salt water. Thousands of miles of marine (salt water) shoreline and hundreds of bays and inlets characterize the water environment of the Tongass. The movement of water from the oceans to the clouds, to precipitation on land, and to its return to the ocean forms the hydrologic cycle. This cycle is dominated by a maritime climate which brings precipitation nearly year-round, with the heaviest amounts from September through January.

Coastal low-elevation rain forests thrive in this maritime climate. Any physical activity in the environment affects the hydrologic cycle in some manner, but the principal points of interaction are climate, streamflow, water quality and water use. The water resources of the Forest can be described as: climate, streamflow regimen, water quality, floodplains, wetlands, water use, and riparian areas.

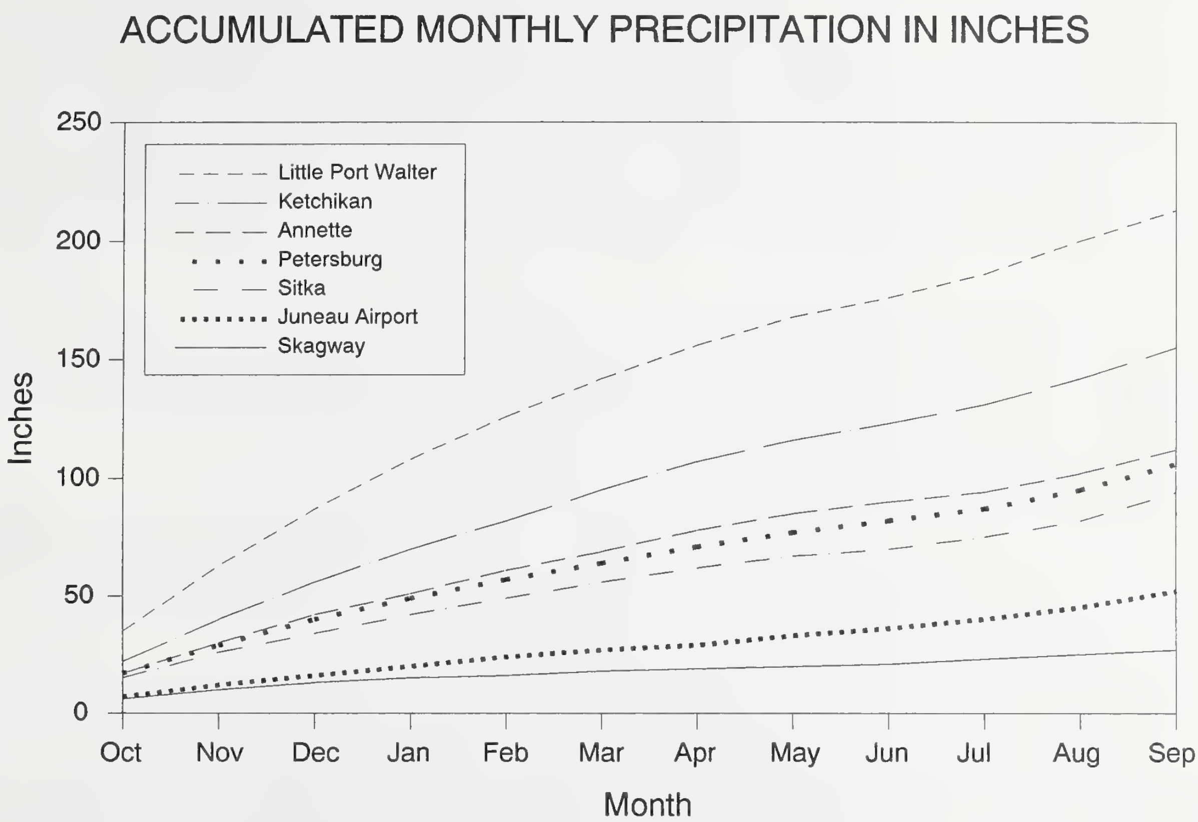
Climate

Dominant pressure cells, known as "Aleutian Lows," are spawned in the North Pacific by the Japanese current and cold Arctic down drafts. Offshoots of the cells move southeastward and push into Alaskan and British Columbian coastal areas, bringing relatively warm, moist air. When these pressure cells meet the rugged coastline, they produce strong winds and large amounts of precipitation.

Sea level precipitation in Southeast Alaska ranges from 30 inches per year at Skagway to 220 inches per year at Little Port Walter. It is estimated that average annual precipitation may be as high as 400 inches on the southern end of Baranof Island and about 260 inches over the Juneau Icefield. Southeast Alaska has complete cloud cover about 85 percent of the year. Snowfall varies according to elevation and distance inland from the coast.

The yearly distribution of precipitation is quite uniform over Southeast Alaska, although different areas receive different amounts. Precipitation exceeds evapotranspiration in all months of most years over most of Southeast Alaska. October is generally the wettest month. High precipitation persists as rain through the middle of November, when intermittent snowfall begins. In the south half of the panhandle, snow accumulation below 500 feet in elevation is short-lived, generally melting off within a few days because of warmer temperatures and rain. In the northern part of the panhandle, low elevation snow packs persist from December through March. At the higher elevations throughout the Forest, the snow cover usually persists until the spring. From the latter part of March through June, precipitation as rain continues to decrease. May through July are, on the average, the drier months. Rain becomes more frequent and of greater duration during September. Accumulated monthly precipitation trends are shown for eight Southeast stations in Figure 3-46.

Figure 3-46



Source: Climatography of the United States No. 81-4. Decennial Census of U. S. Climate

The Pacific maritime influence holds the daily and seasonal temperatures within a narrow range. Temperatures average 32°F in the winter and 60°F in the summer.

Stream Regimen

Glacial and non-glacial river and stream systems occur on the Tongass National Forest. Most of the glacial rivers are located on the mainland and have their origins in the glaciers and snowfields of the Coast Range. Some of the largest of the mainland rivers have glacial origins in Canada. Unlike the rivers and streams of the islands, which generally drain in an easterly or westerly direction into tidewaters, these mainland rivers, for the most part, flow westward.

Streams and rivers produce a large volume of water per unit of land. Runoff varies greatly between mainland and island river and stream systems. Runoff from glacially-fed streams usually starts in June, in response to snow and ice melt, reaching peak flows in July and August. Due to colder temperatures at higher elevations, runoff drops rapidly in October and low flows occur from December through April. Runoff from nonglacial island and Yakutat Forelands streams tend to respond to high precipitation events; therefore, the highest flows tend

to be in October and December and the lowest flows between January and March, and mid-May to August.

In the early 1980's the Forest developed a stream channel classification system called channel typing. Channel types define discrete segments of streams and rivers based on gradient, substrata, streambank vegetation, and other parameters. This system provides a process to classify and map streams in terms of important management parameters. These parameters can then be used to predict the response of different channel types to human- or naturally-caused changes. Stream and lake habitats are categorized into distinctly different groups, called process groups, which are used to assess watershed condition, fish habitat production capability, and sensitivity to management activities. These process groups are described in Appendix J.

An estimated 42,429 miles of stream are recorded on the Forest. These miles are adjusted for estimates of streams in uninventoried Wilderness, and for channels missed in the channel type inventories. At the present level of channel type inventory unmappable streams are typically very small, but may contain valuable aquatic habitat.

Water Quality

Changes in any of the physical or chemical properties of water can directly affect water use by people, fish and wildlife. The most important water quality characteristics are temperature, sediment, dissolved oxygen, and introduction of foreign chemicals. These water quality characteristics are discussed below.

Sediment. Sediment is water-transported earth material. Sediment may be transported as either suspended load or bedload. Suspended sediment is carried within the water column, while bedload material moves (rolls or bounces) along the bottom of the stream or riverbed. Suspended sediment causes water to have a turbid or murky appearance. Under natural conditions the great majority of suspended load and bedload transport occurs during storm runoff events. The rate of sediment transport is dependent on the velocity of the discharge and the availability of material.

Sediment production is controlled by natural geologic processes and can be accelerated by management activities. Soil mass movements (landslides), streams cutting new channels, and bank erosion are the main natural processes creating sediment. Landslides cause large, but temporary, increases in suspended and bedload sediments. Stream and riverbed or bank erosion may contribute to sediment over long periods of time. Steep terrain and large amounts of rainfall make the land sensitive to natural sediment production, and to sediment produced by road construction and timber harvesting activities. Factors limiting or decreasing sediment production include coarse-textured soils with thick organic surface layers, high soil permeability and infiltration, and conditions that favor rapid revegetation of disturbed soil. In addition, all roads are constructed of blasted quarry rock and nearly all logging uses cable yarding systems to minimize the disturbance of soil surface layers. Overland flow is limited to areas where the mineral soil is exposed, to saturated depressions, or in barely-definable ephemeral channels.

In Southeast Alaska suspended sediment loads in non-glacial streams in undisturbed watersheds are very low. Concentrations of suspended sediments normally are less than 10 parts per million (ppm) in winter, four to 30 ppm in summer, and occasionally over 100 ppm in the fall during storm runoff periods. These low levels are attributed to the dense vegetative groundcover.

Suspended sediment in glacial streams is highly dependent on the volume of water flow from snow and ice melt. At high flows, concentrations may reach from 200 to more than 600 parts per million (ppm); and midrange flows may contain 20-100 ppm. Because the amount of glacial meltwater is lowest between November and April, suspended sediment concentrations from November through April seldom exceed 20 ppm.

Water temperature. Stream temperature is a principal regulator of biological activities in the aquatic environment. Fish, and most other aquatic organisms, assume the temperature of the water in which they live. The metabolic activity of fish and other aquatic organisms is, therefore, controlled by water temperature. This activity proceeds most efficiently within a limited temperature range. The State of Alaska Water Quality Standards describe the upper limits as (58°F) for fish migration, 13°C (56°F) for spawning, egg, and fry stages, and 59°F for rearing (18 AAC 70.020, 1973).

The principal source of heat for small streams is solar energy striking the stream surface directly. Most Southeast Alaska streams are not highly sensitive to temperature changes. Frequent cloudiness, low air temperatures, steep channel gradients, and frequent precipitation generally keeps stream temperatures below the range considered harmful to fish. Summer temperatures in main channel streams normally range from 6°C (37°F) to 11°C (52°F), but may occasionally exceed 15°C (59°F); winter temperatures typically range from 0°C (32°F) to 6°C (37°F).

Even though streams in Southeast Alaska are not very sensitive to temperature changes, each stream's sensitivity depends on its own characteristics. These characteristics include streamflow, stream surface area, and the nature of the streambed. In addition, streamside vegetation, water source and aspect are involved in a stream's sensitivity to temperature changes. Streams are considered temperature-sensitive when one or more of the above characteristics changes, allowing the temperature to exceed the State Water Quality Standard for an extended period sufficient to affect fish production. Potentially temperature-sensitive streams in Southeast Alaska typically have one or more of the following characteristics: runoff sources are extensive areas of muskegs or lakes; the stream aspect is southerly; channels are shallow and wide with sluggish or intermittent flows; and channels have extensive beaver ponds. Sensitivity increases from north to south on the Forest.

Dissolved oxygen. Dissolved oxygen is typically at or near saturation in streams due to their self-aeration characteristics. In many lakes and in streams which have smooth, low flows, oxygen concentrations may drop below saturation. Such decreases in dissolved oxygen saturation usually occur in summer dry periods with higher water temperature, when natural biotic demand for dissolved oxygen is at its peak.

Water chemistry. Water in Southeast Alaska is never completely free of organic and inorganic matter, due to the fact that water, a solvent and a mechanical erosive agent, contains many dissolved minerals as well as undissolved sediments. The chemical water quality in Southeast Alaska is high. Total dissolved solids concentrations are typically less than 150 ppm, well within the State of Alaska Water Quality Standards.

In the past, there has been little, if any, introduction of foreign chemicals into surface water of the Forest, whether from fertilizers and herbicides or from accidents involving commercial transportation of toxic substances and petroleum products. The main threats of foreign chemical pollutants in the Forest are from mining activities, petroleum product spills, and logging operations.

Floodplains

Executive Order 11988 directs Federal agencies to provide leadership and take action on Federal lands to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. Agencies are required to: 1) avoid the direct or indirect support of floodplain development whenever there are practicable alternatives; 2) evaluate the potential effects of any proposed action on floodplains; 3) ensure planning programs and budgets requests reflect consideration of flood hazards and floodplain management; and 4) prescribe procedures to implement the policies and requirements of the Order.

Floodplains are usually composed of naturally-eroded sediments carried by the stream or river and deposited in slack water sections of channels during high water periods. Floodplains are considered to be areas subject to a one percent (100-year recurrence) or greater chance of flooding in any given year. Nutrient-rich sediments underlain by coarse-textured sediments make floodplains the most productive lowland timber, wildlife and fisheries resource sites on the Forest.

The Forest's floodplains are typically found in broad, flat, alluvial U-shaped valleys, are forested, and usually support plant communities having an overstory of Sitka spruce or Sitka spruce and western hemlock. The shrub understory is variable and may include blueberry, skunk cabbage, devil's club, salmonberry, and alder. The herb understory is dominated by ferns and broadleaf plants. Supporting this vegetation are well, moderately well, or somewhat poorly drained deep mineral soils with thin organic surface layers. Floodplains are associated with 21 percent of the 42,429 linear miles of the streams mapped on the Forest.

Flooding may occur in a diversity of land types including steep, narrow mountain canyons, wide, flat alluvial valleys, lake shores, coastal areas and alluvial fans. The potential flooding sites in the Tongass National Forest are the varying width floodplains and terraces of the valley bottoms of U-shaped valleys. To date, no area-wide flood hazard or flood insurance studies have been conducted in the Forest. Soils and landform inventory data are the only available information for making initial determinations of the location and approximate boundaries of floodplain areas.

Wetlands

Executive Order 11990, as amended (42 U.S.C. 4321 et.seq.), requires Federal agencies that exercise statutory authority and leadership over Federal lands to avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands. Where practicable, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibility for 1) acquiring, managing, and disposing of lands and facilities; 2) providing federally undertaken, financed, or assisted construction and improvements; and 3) conducting federal activities and programs affecting land use.

The Army Corps of Engineers (COE) (Federal Register 1982) and the Environmental Protection Agency (EPA) (Federal Register 1980) jointly define wetlands as: "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

"No net loss" policy. The two agencies (COE and EPA) signed a Memorandum of Agreement that provides clarification and general guidance on mitigation necessary to comply with the

Clean Water Act in connection with Standard Section 404 dredge and fill permits. The President's Domestic Policy council is to develop recommendations for the goal of "no net loss" of the Nation's wetlands. This council is aware of the challenges posed in Alaska, where a high proportion of developable lands are wetlands and where opportunities for compensatory wetlands are limited.

Wetlands delineation. The Corps of Engineers Wetlands Delineation Manual (Army Corps of Engineers, 1987) provides the standards for determining areas of wetlands and deepwater habitats. In addition, DeMeo and Loggy (Unpub. Paper, 1989) have classified wetlands water habitats on the Tongass National Forest. Land areas were defined as wetlands when soil, hydrology, and vegetation all met the technical criteria for establishing wetlands. Streams and lakes where classified using the criteria established by Cowardin (1979) and data from stream and lake inventory of the Forest's channel type inventory system. (See Chapter 3, "Water," Analysis of the Management Situation, Tongass National Forest, January 1990 for a more detailed discussion.)

Wetland functions include flood flow moderation, groundwater recharge and discharge, wildlife and fish habitat, and water quality protection. On the Tongass, wetlands are made up of forested sites on both poorly and very poorly drained organic soils and poorly and somewhat poorly drained mineral soils. Muskegs are found on poorly and very poorly drained organic soils. Wetlands may be found from sea level to alpine elevations, and may include estuaries.

Wetland systems and classes are described briefly below, with amounts of each listed in Table 3-159.

Table 3-159
Acres or miles by wetland system and class

Wetland Systems	Wetland Classes	Acres[1]	Miles[1]
Palustrine	Muskeg	1,145,566	
	Forested	1,379,173	
	Scrub-shrub[2]	435,301	
Estuarine		20,719	
Riverine			42,429
Lacustrine		268,000	
Total Wetlands		**3,248,759**	**42,429**

Source. Revision Database. Compiled from soil and channel typing inventory data.

[1] Represents the acres of wetlands that have been mapped in wilderness and non-wilderness areas on the Forest.

[2] 153,198 acres of Scrub-shrub meet the Forest Services's criteria of being forested lands. These forested lands are classified as Scrub-shrub wetlands because the trees are less than 20 feet in height.

Palustrine wetland system. The Palustrine wetland systems include the vegetated wetlands traditionally referred to as marshes, swamps, bogs, fens and prairies. They include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent. Palustrine wetland classes include moss-lichen and emergent wetlands (muskegs), scrub-shrub wetlands and forested wetlands. Classes are described in the following paragraphs.

<u>Muskeg class</u>. Muskegs, the most unique and distinct of the Palustrine wetlands, comprise 35 percent of the total mapped wetland area on the Forest. "Muskeg" according to Hanson

(1962) denotes a bog in the northern part of North America characterized by an abundance usually of sphagnum moss and greater or lesser abundance of shrubs and low trees. In Southeast Alaska, all relatively open bogs that have a groundcover high in sphagnum mosses and/or sedges are called "muskegs."

Forested class. Forested wetlands comprise 43 percent of the total mapped wetland acres. Soil drainage depending on soil type ranges from somewhat poorly to poorly drained. Vegetation ranges from scrubby mixed conifer forests (greater than 20 feet high) on the poorly drained sites to moderately productive mixed conifer, western or mountain hemlock stands on somewhat poorly drained sites. Shrubs and forbs dominate the understory.

Scrub-Shurb class. Scrub-shrub wetlands areas are the most vegetatively varied wetland classes in Southeast Alaska. They comprise 13 percent of the total mapped wetland acres. Soil drainage on these wetland areas, depending on soil type, ranges from poorly to very poorly drained. Plant species may include true shrubs, young trees, and tree and/or shrubs that are small or stunted because of environmental conditions. Scrub-shrub wetlands are associated with three broad wetland plant communities named scrub-shrub alder/willow, scrub-shrub evergreen/muskeg, and forested scrub-shrub evergreen/muskeg.

Estuarine wetland system. Estuarine wetlands are those areas that are predominantly intertidal, and are those parts of the rivers or streams or other bodies of water having an unimpaired connection with the open sea, where the sea water is diluted with fresh water derived from land drainage. Since the Forest Service is not chartered to manage ocean areas, the Forest's wetland inventory data does not cover the areas below mean-high high tide. Estuarine wetlands comprise about one percent of the Forest's mapped wetlands.

Riverine wetland aystem. The Riverine Wetland System includes all channel-contained streams and rivers, 42,429 miles Forest-wide. These areas are bounded by uplands, channel banks or wetlands dominated by trees, shrubs, emergent mosses or lichens. In braided streams, the riverine wetland system is bounded by the banks forming the outer limits of the depression within which the braiding occurs.

Lacustrine wetland system. The lacustrine system includes all permanently flooded lakes, reservoirs, and tidal lakes with ocean-derived salinities below 0.5 parts per thousand. Eight percent of the total mapped wetland acres are lacustrine.

Riverine wetland system and riparian relationship. Riverine system wetlands include the aquatic ecosystems of riparian areas. These transitional areas along streams have soils, vegetation and hydrology characteristics that meet both riparian and wetlands criteria. Management requirements for such areas may overlap each other.

Riparian

The emphasis of management in riparian areas is to maintain habitats for fish and other riparian-associated resources. Management direction for meeting the basic requirements for protecting riparian areas is included in the National Forest Management Act Regulations (36 CFR 219.27(e)), Tongass Timber Reform Act, Section 103, which amends Section 705 of ANILCA, and the Clean Water Act.

The National Forest Management Act regulations for riparian areas that "No management practices causing detrimental changes in water temperature or chemical composition, blockages of water courses, or deposits of sediment shall be permitted ... which seriously and adversely affect water conditions or fish habitat." The Tongass Timber Reform Act, in Section 103, states that "In order to assure protection of riparian habitat, the Secretary shall maintain a buffer

zone of no less than one hundred feet in width on each side of all Class I streams in the Tongass National Forest, and on those Class II streams which flow directly into a Class I stream, within which commercial timber harvesting shall be prohibited ..." It continues on to require "The Secretary shall use Best Management Practices, as defined in the Region 10 Soil and Water Conservation Handbook ..., to assure the protection of riparian habitat on streams or portions of streams not protected by such buffer zones."

Table 3-160 displays the acres of riparian buffers associated with the land area 100 feet on each side of streams for each stream class and Administrative Area. The table includes the acres associated with streams not required by the Tongass Timber Reform Act to have a 100-foot buffer. The number of acres are derived from channel inventory data which have been electronically buffered by computers. Note that these acres are not inclusive of all riparian areas on the Forest; wilderness areas are not shown because the majority of wilderness areas have incomplete inventory data, and the table does not indicate riparian acres beyond the 100-foot buffer. The following discussion applies only to the 100-foot buffers, outside of wilderness areas.

The riparian buffers include: 1) old growth (Volume Classes 4-7); 2) areas that were originally old growth but are now re-growing following timber harvest; and 3) areas that never supported old growth and may be alpine, muskeg, unproductive forest, natural landslides, or in other vegetation states. As shown in Table 3-150, prior to 1954, the approximate year when large-scale industrial timber harvest began on the Tongass, an estimated 70 percent of the riparian area (buffers) on the Forest were old-growth forests. Thirty percent were not old growth, and most of these are unlikely to ever produce old growth. Timber harvest of riparian areas before 1954 accounted for less than one percent of the total area now in riparian buffer.

Between 1954 and 1990, approximately 25,700 acres of old-growth buffer were harvested, or approximately eight percent of the 306,882 originally in old-growth buffers in non-Wilderness areas. The distribution of the old growth harvested in riparian areas is shown in Table 3-160 by administrative area and stream class. The majority of the harvest was on the Ketchikan Area, followed by the Chatham and Stikine Areas with Class I streams having the largest percentage of timber harvest. Table 3-160 also displays the number of acres of old-growth riparian area buffers currently remaining.

Considering all riparian buffered areas, both with old growth or which could never support old growth, Table 3-160 shows the percent of area that have not had even-aged timber harvest activities. The table shows that 97, 94 and 89 percent of the Chatham, Stikine, and Ketchikan Areas, respectively have received even-aged timber harvest activities. Overall, across the Forest, 94 percent of the 100-foot buffers (in non-Wilderness Areas) have not had even-aged timber harvest. The greatest percentage of activity has been on the Class I streams on the Ketchikan Area. Forest-wide, with an estimate of the 100-foot buffers included for Wilderness Areas (Wilderness makes up approximately 38 percent of the Forest), about 4 percent of the Forest's riparian buffer areas have had even-aged timber harvest activities.

Riparian ecosystems harvested for timber are now in various states of secondary plant succession. Except where the ground is highly disturbed, the stand composition on these secondary successional riparian areas is very similar to the riparian vegetation prior to timber harvest with spruce, hemlock and cedar forming the tree canopy. On the more disturbed sites, the vegetation will often appear as primary successional species, such as occurs following deglaciation, with alder being the primary vegetational component.

Table 3-160

Riparian status on the Tongass Administrative Areas by stream class[1]

Stream Class	Total Riparian Acres[2]	Pre-1954 Old-growth Acres	Percent of Total Riparian Acres	Acres Harvested to 1990	Percent of Old-growth Acres Harvested	Percent of Total Riparian Acres	Acres of Old-growth Remaining 1990	Percent of Total Riparian Acres	Acres[2]	Percent of Total Riparian Acres	Acres	Percent of Remaining Unmanipulated Acres
Chatham												
I	57,640	32,425	56	3,881	12	6	28,544	50	29,096	51	53,759	92
II	45,021	27,358	61	1,320	5	2	26,038	59	18,983	41	43,701	97
III	77,444	29,696	38	780	3	1	28,916	37	48,528	63	76,664	99
Subtotal	180,105	89,479	50	5,981	7	4	83,498	46	96,607	54	174,124	97
Stikine												
I	38,856	33,996	88	1,520	5	4	32,476	84	6,380	16	37,336	96
II	18,792	16,555	88	1,120	8	6	15,435	82	3,357	19	17,672	94
III	69,641	47,935	69	2,700	6	4	45,235	65	24,406	35	66,941	96
Subtotal	127,289	98,486	77	5,340	5	4	93,146	73	34,143	27	121,949	96
Ketchikan												
I	49,591	43,773	88	6,000	14	12	37,773	76	11,818	24	43,591	88
II	23,077	21,577	94	2,981	14	13	18,596	81	4,481	19	20,096	89
III	60,449	53,569	89	5,423	10	9	48,146	80	12,184	20	55,026	91
Subtotal	133,117	118,919	89	14,404	12	10	104,515	79	28,483	21	118,713	89
Total	**440,511**	**306,884**	**70**	**25,725**	**8**	**6**	**281,159**	**64**	**159,233**	**36**	**414,786**	**94**

Source: Revision Database -Query 97NA.Out

[1] Riparian acres are for non wilderness streams, buffered 100 feet either side of the stream.

[2] There acres include harvest old-growth acres because the harvested old-growth sites are no longer in an old-growth vegetative climax state.

Secondary successional riparian ecosystems may or may not provide all the riparian area wildlife and vegetative species that existed before timber harvest and road construction. They do, however, supply changing habitat types and species composition. If natural successional processes are allowed to continue over time without additional disturbance, these secondary successional riparian ecosystems will eventually return to their original ecosystem stage. The only condition where this will not occur is where roads have been constructed and maintained.

Water Use

Key water uses on the Forest include domestic water supply, recreation, growth and propagation of fish, and hydroelectric power generation. The Forest supplies domestic water for 18 permanent communities. Ketchikan, Sitka and Petersburg have congressionally-designated municipal watersheds. In addition, water is supplied from the Forest to nine fish hatcheries, three industrial sites, nine logging camps, and three resorts.

Hydroelectric generation continues to be used in many places throughout the Forest to provide electricity for mining, sawmills, pulpmills, communities and other uses. There are six major power installations on the Forest. These installations are the Snettisham, south of Juneau; Beaver Falls, Ketchikan Lakes and Swan Lake east of Ketchikan; and Blue and Green Lakes north and east of Sitka. Additional installations and interties between installations are proposed.

Methodology and Scientific Accuracy

Information on suspended sediment as the result of management activities is limited, especially for timber harvest and road construction activities. The present knowledge is documented in the following discussions of actual project monitoring.

Suspended sediment loads were low in two heavily logged watersheds. In these watersheds near Hollis, where clearcuts exceeded 2,000 acres in size, suspended sediments during and following logging in the Harris River never exceeded 3.7 ppm under average flow conditions or 148 ppm during peak flows. In the Maybeso watershed, suspended sediments never exceeded 7 ppm during average flow or 38 ppm during peak flows.

In investigations of bridge installations across streams, data was gathered before, during, and after construction. In 1977 a sedimentation monitoring study was conducted at Bonnie Creek on Prince of Wales Island, while equipment worked in the stream installing bridge stringers (Bartos, 1990). Best Management Practices (BMP's) to protect water quality (discussed later under Mitigation) were not used. Samples taken approximately 100 feet downstream during the construction indicated a sediment discharge of 219 parts per million. Background sampling upstream from the construction found sediment discharge of only 0.2 ppm. The average discharge was 147 cubic feet per minute at the time of the investigation. This investigation showed that without application of BMP's, a significant increase in sedimentation occurred over background levels for a short period of time.

In March 1978 an investigation of a small bridge installation showed no large increase over natural levels in sediment downstream from the construction site with the use of Best Management Practices. During this bridge installation, heavy equipment was restricted to a one-time stream crossing and required to sit on pads while in the stream. Two days of sediment measurements immediately downstream of the construction site measured 16.5 to 76.5 and 34 to 99.8 ppm respectively. The background level of sediment transport for the two days of investigation was 0.85 and 0.25 parts ppm respectively. The dropout rate within a 100-foot reach below the construction site was 61 percent. Discharge through the construction area and during the sampling period ranged from 6.73 cubic feet per second the first day to 5.58 cubic feet per second on the second day.

Paustian (1987) reported effects of sediment yields from application of BMP's in harvesting and roading in 11 square miles of the Indian River Watershed, and roading in three first and second order watersheds (30 to 80 acres) of the Kadashan Watershed. Both of these major watersheds are located opposite each other in Tenakee Inlet.

The results of the monitoring investigation in the Indian River Watershed indicated estimates of annual suspended sediment yields of 796 and 979 tons for the water years 1980 and 1981. These values where within the range of suspended sediment yields of 475 and 1,103 tons during the pre-logging baseline period of the water years 1978 and 1979. Regression analysis comparing suspended sediment concentration and discharge measurements showed no detectable change in suspended sediment delivery during the first two years of logging activities in the watershed.

At the time of the report, no timber harvest activity had taken place in the Kadashan drainages and the road had not been used by heavy trucks. Paustian reported that little deposition of sediment was observed in the sediment settling basin in the first year, but road construction did cause short-term increases in suspended sediment transport downstream of the sediment basins. During the post-road period, sediment yields were observed in the three streams of +.5 tons, +1.5 tons, and +4 tons, equating to a 20 percent, 33 percent, and 66 percent increase, respectively, compared to the pre-road period. Due to the short period of investigation record,

it was impossible to determine statistically how much of this observed sediment increase could be attributed to road construction activity, and what portion to natural variations in sediment yield.

These monitoring investigations demonstrate the variability in sediment from natural and land management activities. They also indicate that there is inconclusive data to determine at the present time the effects of land management or the effective application of Best Management Practices (BMP's). The Forest is initiating a stricter program in implementation of BMP's and monitoring their effectiveness. Research studies have also been started on quantifying the sediment resulting from management activities, with cooperation of the Forestry Sciences Laboratory in Juneau.

Water

Environmental Consequences

Direct, Indirect and Cumulative Effects

Forest management activities may affect water quality and quantity, and timing of water flows, through alteration of soil and watershed conditions. Most watersheds are in a state of dynamic equilibrium where changes occur naturally due to changes in weather patterns. Because of the overriding influence of climate, and basin resiliency, changes in streamflow and sediment delivery resulting from management activities (such as timber harvest) are difficult to measure. For the effects of sedimentation, see the Soils section of this chapter.

Stream Flow

Watersheds in Southeast Alaska, compared to watersheds in other areas of the United States, return to previous flows and water yields rapidly after timber harvest and road construction, as long as an excessive amount of the total drainage area is not harvested at one time. Bartos (1989) evaluated changes in USGS stream gauge discharge data (1965 to 1981) for the Staney Creek drainage in relation to timber harvest through use of a water yield model. The analysis for the Staney Creek Watershed indicated that there were more acre-feet of water being discharged beginning in 1972. Timber harvest records indicated that the 1972 water year followed a year of substantial timber harvesting (2,010 acres or 3.15 square miles). Substantial harvesting activity had occurred prior to 1972 (3,841 acres or 6.08 square miles) with no observable changes in yield, probably because the earlier harvest occurred over a larger area over a five-year period. A flow duration analysis was completed using daily discharge for each year over the record period to determine if the flow regime was influenced by the harvesting in the Staney Creek Watershed. This analysis indicated a significant increase in the low flow discharges after 35 percent of the drainage had trees removed.

Whether the same response is occurring due to clearcutting in the northern half of the Forest, which generally has coarser-textured soils and steeper mountain terrain, has not been determined. Due to the tyically greater proportion of water storage and release controlled by alpine areas, stream flow on the northern part of the Forest probably is less affected by timber harvesting.

Long-term decreases in low stream flows may also occur following timber harvest (Myren, 1991). This could result from increases in water take-up and evapotranspiration in rapidly growing second-growth stands.

An increase in mean and low flows can be considered a benefit during the low precipitation periods that occur in the summer and early fall; a decrease could lead to less rearing habitat for fish. However, the potential for changes in mean and low flows for any area is extremely low. As shown in Table 3-161, the acreage of suitable timber scheduled for harvest in any alternative is relatively small in comparison to the total acres available for harvest. The acres that would be harvested in any one year average only about one percent of the total acres scheduled for harvest over the first five decades for all alternatives. Less than ten percent of the scheduled acres would be harvested over the entire first decade in any alternative. Forest watersheds are large in size, and their total overall flow characteristics generally overshadow any increases or decreases that may occur from these projected amounts of timber harvest.

Table 3-161

Relationship of harvested acres to acres available and suitable, by alternative

	Alternatives				
	A	B	C	D	P
Total Acres Available	3,240,348	3,956,757	5,759,319	5,521,083	5,239,342
Suitable Acres Available and Scheduled	1,173,000	1,360,000	1,732,400	1,818,400	1,601,000
Percent Available Acres Scheduled	36%	34%	30%	33%	31%
Average Acres Harvested by Decade, Decades 1-5	120,000	138,000	180,000	180,000	160,000
Percent of Scheduled Acres Harvested Annually, Decades 1-5	1.02%	1.02%	1.04%	0.99%	0.97%
Total Harvest Acres, First Decade	115,000	131,000	169,000	172,000	156,000
Percent of Scheduled Acres Harvested, First Decade	9.8%	9.6%	9.6%	9.5%	9.5%

Mitigation. The actual effect on the amount of stream flows from watersheds will be minimized by using Best Management Practices outlined in the Forest-wide standards and guidelines (see Proposed Revised Forest Plan, Chapter 4). Timber harvest will be limited to no more than 35 percent of third and fourth order watersheds within a 15-year period or to some level as determined by a cumulative watershed effects analysis at project level. The actual effects from changes in stream flows can only be determined during project planning, where actual locations of proposed roads and harvest units will be analyzed in relationship to the size, geology, climate, and past management of the watershed.

Sediment

Some increase in sediment yield is expected from management activities. Timber harvest activities, such as road and rock pit development, log-landing construction, and occasionally yarding, are the activities that have the greatest potential for sediment yields. Landslides initiated directly or indirectly by these activities are thought to be the major source of sediment to streams. Due to the amount of vegetative ground cover remaining in harvest units after yarding, there is usually minimal sediment potential from surface erosion of soils. Sheet, rill or gully erosion are secondary in importance to the effects of landslides in causing sediment deposits in streams.

Information on landslide occurence in timber harvest areas of the Tongass, and estimates of landslide frequency and extent by alternative, were presented in the environmental consequences portion of the Soils section of this chapter. (Please refer to that section for a more detailed analysis.) About nine percent (a total number of 118) of the landslides inventoried over a 20 year period were associated with timber harvesting (Swanston, 1989). Swanston also found that six percent of these 118 landslides actually affected known anadromous fish streams. Using the number of landslides projected to occur by decade by alternative in the Soils section (see Table 3-103), Table 3-162 gives an estimate of landslides that would actually result in sediment increases to streams.

Table 3-162

Projected total number of landslides, and landslides affecting fish streams, by decade and cumulatively, by alternative

Alt.	Unit of Measure	Decade 1	Decade 2	Decades 1-5
A	Total Number	51	102	255
	Affecting Fish Streams	3	6	16
B	Total Number	58	116	285
	Affecting Fish Streams	4	7	18
C	Total Number	75	156	400
	Affecting Fish Streams	5	9	24
D	Total Number	76	162	415
	Affecting Fish Streams	5	9	25
P	Total Number	70	146	360
	Affecting Fish Streams	4	9	22

Source: Revision FORPLAN Reports, June 1991. Based on the landslide rates calculated by Swanston (1989) for areas harvested 1963-1983.

There is little information available on the amount of soil erosion resulting from road construction and use in southeast Alaska (see this section's discussion on the affected environment). Because of the almost complete lack of quantitative measurements, evaluation of the total area of road disturbance is one of the best measures of the effects of roads. The difference in miles of roads, and acres disturbed by the roadbeds, between alternatives is an indicator of how the potential site-specific effects may differ. These site-specific effects must be evaluated more precisely during project planning, based on the specific conditions found at the project site. These effects will vary based on the parent material of the soils of the land surface, the slope and location within the watershed on which the road may be built, the mass movement hazard of the soils, the quality of the surfacing material used, and the projected use of the road.

The number of miles of road to be constrcted is included in the Transportation section of this chapter. The acres of roads resulting from the road miles, including the cumulative total number of acres of land anticipated to be directly affected by the roads, is shown by alternative for the first, fifth and tenth decades following implementation of an alternative in Table 3-163.

Table 3-163

Cumulative roaded acres by alternative for the first, fifth and tenth decades after implementation[1]

Alt.	1990 Roads	Decade 1 Proposed	Decade 1 Cumulative	Decade 5 Proposed	Decade 5 Cumulative	Decade 10 Proposed	Decade 10 Cumulative
A	10,065	4,062	14,127	11,724	21,789	15,450	25,515
B	10,065	4,728	14,793	13,791	28,856	18,756	28,821
C	10,065	6,621	16,686	19,971	29,775	26,466	36,531
D	10,065	6,705	16,770	19,668	26,733	27,120	37,185
P	10,065	6,036	16,101	17,862	29,927	23,961	34,026

Source: FORPLAN Reports, June 1991, adjusted for acres at the ratio of three acres for each mile of road.

[1] "Proposed" refers to the acres of land that are anticipated to be affected by roads from the beginning of Revised Plan implementation to the end of the decade shown in the column heading. "Cumulative" includes the acres in the proposed column plus the acres of currently existing road acres (1990).

As of 1990, the total area directly disturbed by roads was estimated to be 10,065 acres, or 0.65 percent of the total roaded portion of the Forest (areas considered roaded total 1.54 million acres; see the Roadless section of this chapter). The total area disturbed by roads for each of the alternatives is shown in Table 3-163. The percent of the roaded land base in road surface (at the end of the 15th decade) is 0.9 for Alternative A, 0.9 for Alternative B, 1.1 for Alternative C, 1.0 for Alternative D, and 1.0 for Alternative P.

As shown above, the acres of land disturbed by roads in each alternative is very low. However, in an individual watershed, especially those with a large proportion of suitable timber, the percentage of lands that could be in a disturbed state due to timber harvest may be considerably higher. Analysis of site-specific effects for individual project locations will be done during the project planning phase of environmental analysis.

Mitigation. Few monitoring investigations have been conducted in Southeast Alaska to measure sediment increases resulting directly from road construction, stream crossing, and timber cutting and yarding activities. The monitoring investigations previously discussed demonstrate the inconclusiveness of the data concerning the effectiveness of Best Management Practices (BMP's) in reducing or preventing sediment yields. BMP's, as specified in the Forst-wide standards and guidelines, Appendix C of the Proposed Revised Forest Plan, and FSH 2509.22, will continue to be the primary tool used for the Tongass National Forest to mitigate the effects of logging activities on water quality. Some short-term degradation of water quality from increased turbidity and suspended particulates is unavoidable, particularly during road construction. Best Management Practices will be applied to management activities to meet all State and Federal Water Quality Standards. BMP's will be planned, implemented, and monitored at the project level.

Temperature

Most Southeast Alaska streams are not highly sensitive to temperature changes. Frequent cloudiness, low air temperatures, steep channel gradients, and frequent precipitation tend to keep stream temperatures below the levels considered harmful to fish. However, stream temperatures may be increased if long strips of shade-producing vegetation are removed from along south, southwest, west, and northwest banks of temperature-sensitive streams. The streams most likely to be temperature-sensitive usually contain lakes, muskegs and organically-

stained water. Many have low channel gradients, and southeast to southwest exposures. (See also the Fish section of this chapter for further discussions of the effects of water temperature on fish.)

Mitigation. Projected timber harvesting should not significantly increase water temperature under any of the alternatives. The Tongass Timber Reform Act (TTRA) requires a minimum 100-foot in width no commercial timber harvest buffer along both sides of all Class I streams, and Class II streams that directly flow into Class I streams. Best Management Practices are required along all streams not protected by the buffers. Application of these buffers as part of the Stream and Lake Protection Land Use Designation (LUD) or the Fish Habitat and Water Quality Requirements LUD (for Alternative D) should provide the necessary shade so that water temperature will be maintained at present levels in timber harvest areas for Class I and most Class II streams.

One of these LUD's will also be applied to other Class II, and to Class III, streams where timber harvest is to occur. Usually water temperatures on Class III streams are not a problem since Class III streams usually have fast flows allowing the water less time to heat up, the streams to receive less radiation, and the water to require less time to be assimilated into larger bodies of water. Thus, no significant increase in temperature is anticipated. A risk of potential storm blowdown of buffers exists through application of either riparian area LUD. The potential is greater in areas with higher harvest levels. The effect of blowdown on water temperature in Southeast Alaska is not known.

Dissolved Oxygen

The majority of streams in Southeast Alaska are moderate to high gradient streams with turbulent flows. Abundant precipitation and turbulent flow causes the streams to be oxygen rich. Biochemical Oxygen Demand (BOD) is a product of plant and animal respiration, and can become a concern with the decomposition of large amounts of fine organic material and large numbers of fish during a period of little to no replenishing of the watershed water supply. Most Southeast Alaska streams are not considered highly sensitive to dissolved oxygen depletion from timber harvesting activities. High dissolved oxygen concentrations are maintained by the same natural characteristics that keep stream temperature low. However, dissolved oxygen levels and biochemical oxygen demand may be affected if logging slash is allowed to accumulate in streams.

Mitigation. With use of the Stream and Lake Protection, or Fish Habitat and Water Quality Requirements (Alternative D), LUD's, timber harvest will not directly affect dissolved oxygen. Harvest may occur only along limited portions of any stream (e.g., yarding corridors and road stream crossings). BMP's and timber sale contract clauses require accumulations of logging slash to be cleaned from streams at these locations. BOD conditions in streams could be affected indirectly by significant blowdown of the stream buffer into the stream. Harvest adjacent to stream buffers can make them more vulnerable to blowdown, as the buffer vegetation becomes more dependent on its own windfirmness rather than having an adjacent block of timber for additional protection.

Wetlands

There are 3,248,759 acres of lake and land-type wetlands within the inventoried (by soil resource inventories) portions of the Forest, and an estimated Forest-wide total of 42,429 miles of riverine wetlands . Of the inventoried portion (11,347,468 acres), lake and land-type wetlands represent 31 percent of the total Forest acreage. Wilderness existing prior to passage of the Tongass Timber Reform Act (TTRA) has not had soil resource inventories, and thus the extent of wetlands within those areas is unknown.

Table 3-164 displays, by land use designation group, the total acres and acres of wetlands for each alternative. The Wilderness LUD group is not included, since as just explained the extent of wetlands there is not known. Within the 299,697 acres of Wilderness added to the Forest by TTRA, there are 50,982 acres of wetlands, or 17 percent of the total.

As can be seen from the table, the percentage of total LUD group acres that are classified as wetlands is higher in the LUD groups that allow timber harvest and road construction. The percentage of wetlands in the Intensive Development group ranges from 55 percent (Alternative A) to 41 percent (Alternative D), as compared to the Natural Setting group, which has a range of 24 to 19 percent. This probably results from the large percentage of rock, ice, and alpine areas in the natural setting LUD group.

Table 3-164

Acres and percentage of wetlands within Land Use Designation groups by alternative[1]

Alt.	Unit of Measurement	Intensive Development	Moderate Development	Natural Setting
A	Total Acres	821,069	2,430,471	7,814,693
	Wetland Acres	448,545	833,228	1,916,018
	Percent Wetlands	55	34	24
B	Total Acres	1,842,686	2,123,603	7,099,945
	Wetland Acres	883,836	710,234	1,603,721
	Percent Wetlands	48	33	23
C	Total Acres	3,148,037	2,627,300	5,290,896
	Wetland Acres	1,341,190	844,011	1,010,590
	Percent Wetlands	43	32	19
D	Total Acres	4,148,845	1,381,932	5,535,457
	Wetland Acres	1,684,502	400,861	1,112,428
	Percent Wetlands	41	29	22
P	Total Acres	2,479,766	2,753,901	5,832,567
	Wetland Acres	1,105,669	914,220	1,177,901
	Percent Wetlands	45	33	20

[1] Excluding the Wilderness LUD group, which has not been inventoried for wetlands.

Source: Revision Data Base, July 1991

The large acreage and general distribution of wetlands throughout the Southeast Alaska landscape makes it impossible to avoid construction on wetlands if resource management activities are to occur. The chemical, physical and biological integrity of wetlands as waters of the United States will be affected mainly through timber harvest operations, which include the construction and maintenance of roads, landings and stream crossing structures. Silviculture operations such as cultivating and harvesting trees are exempted from U.S. Army Corps of Engineers 404 Permit requirements (33 CFR 323.4). The construction or maintenance of permanent or temporary roads in support of silvicultural practices and temporary roads for moving mining equipment are also covered under this exemption for the discharge of dredged or fill material into non-navigable waters of the United States. This exemption is contingent on

the construction and maintenance being conducted in accordance with BMP's described in the State's approved program, pursuant to the requirements of 40 CFR Part 233.33(i), and the baseline provisions as outlined in 33 CFR 323.4 [6] (i) thru (xv).

As required by law, the Forest will obtain general or standard permits from the Corp of Engineers (COE) for the discharge of dredged or fill material into waters and wetlands for any activity not exempted. Certain discharges specified in 33 CFR Part 330 are permitted by that regulation ("nationwide permits"). Some of the activities allowed under this regulation that the Forest may become involved in include: 1) fish and wildlife harvesting devices and activities; 2) staff gauges, tide gauges, water recording devices, water quality testing and improvement devices, and similar scientific structures; 3) bank stabilization activities with provisions listed; 4) minor temporary and permanent road crossing fills including all attendant features with described provisions; and 5) discharges of dredged or fill material incidental to the construction of bridges across navigable waters including attendant features. The special conditions listed in 330(b) must be met for the nationwide permits to be valid. Other discharges may be authorized by district or division engineers on a regional basis ("regional permits").

Table 3-165 shows the projected acres of road to be constructed in wetlands within roaded and proposed roaded areas as of 1990, and for each alternative for the first, fifth and tenth decades. Total wetland loss in roaded areas, as of 1990, due to past construction of roads, landings, and associated drainage structures in association with silvicultural practices, is 1,342 acres or 0.02 percent of the present roaded areas. This 1,342 acre loss of wetlands equals 0.04 percent of the total inventoried wetland acres and 0.05 percent of wetlands in existing and proposed roaded areas on the Forest. In the first decade, removal of wetlands from production due to the cumulative road acres ranges from 1,884 acres in Alternative A to 2,236 acres in Alternative D. Ranking of alternatives from least acres to most acres of roads is A, B, P, C and D. Percentage of wetland acres removed for roads is 0.08 percent for each alternative in the first decade. This is because, as road acres increase, so do the total number of acres, including wetlands, that are accessed.

In the tenth decade there is a difference in roaded acreage between alternatives but there is only a slight difference in percent of total wetland being lost to roads. By the tenth decade, removal of wetlands acres from production due to cumulative road acres in roaded and proposed roaded areas ranges from an estimated 3,402 acres in Alterative A to 4,537 in Alternative D. The maximum potential effect would be construction of all the roads in Alternative D in the 10 decades on wetlands. Even with this scenario wetland loss is likely to only be 4,958 miles (40,680 acres) or about equal two percent or less of the total vegetated wetlands for the existing roaded and proposed roaded areas. Wetland types that are most likely to be roaded are: first, the forested wetlands, followed by scrub-shrub wetlands, muskegs, and last, the tidal flats (estuarine).

Table 3-165

Existing (1990) and proposed roading (in acres) in wetlands

Alt	1990 Roads	Decade 1 Proposed	Decade 1 Cumulative	Decade 5 Proposed	Decade 5 Cumulative	Decade 10 Proposed	Decade 10 Cumulative
A	1,342	542	1,884	1,563	2,905	2,060	3,402
B	1,342	630	1,972	1,839	3,181	2,500	3,842
C	1,342	883	2,225	2,628	3,970	3,529	4,871
D	1,342	894	2,236	2,622	3,964	3,616	4,958
P	1,342	814	2,146	2,382	3,724	3,195	4,537

Source: FORPLAN files and GIS Data (Query Q97)

Mitigation. Even though normal silviculture practices, including timber harvest and supporting road construction and maintenance, are exempted from COE 404 permit system for dredged and fill materials, the Forest will continue to use Best Management Practices in all management activities which could affect water quality within wetlands.

Riparian Areas

Riparian areas, as a component of aquatic and riparian ecosystems, will be protected through use of the Stream and Lake Protection Land Use Designation (or Fish Habitat and Water Quality Requirements for Alternative D) where there is the potential for adverse effects from a management activity. Presently 95 percent of all riparian areas (see previous discussion under Affected Environment) are in a natural condition, with eleven percent of the riparian commercial forest area having been harvested.

The use of the either riparian LUD will minimize the effects of management activities on riparian areas. The potential effects of blowdown would be as previously discussed. Alternatives A and B would have more acres of existing timber remaining to protect riparian resources, while Alternatives C, D and P will remove more timber and provide less protection.

Mitigation. The application of Best Management Practices (BMP's) will minimize or prevent adverse effects on water quality from the limited areas of timber harvest, yarding corridors and road stream crossings. BMP's will also be applied to Class I and II streams where selective or single-tree harvest is allowed. Class III streams would be provided with variable treatment with application of the Stream and Lake Protection or Fish Habitat and Water Quality Requirements LUD's. Some Class III streams would have narrow no-harvest buffers, however, most would be considered for clearcut harvest to the streambank. Overall, Alternative A would provide the least risk to water quality, followed by Alternatives B, P, C and D.

Wild and Scenic Rivers

Affected Environment

Changes Since the DEIS

Analysis of information related to the tentatively eligible rivers has continued. This Supplement, including Appendix E, "Wild and Scenic Rivers," differs from the DEIS in the following ways:

The river corridors have been entered into the Geographic Information System data base, allowing an accurate compilation of acreage information on resources, including total acres, tentatively suitable forest lands, miles of anadromous fish stream, and related resource information. This improvement to the electronic data base has allowed a more detailed assessment of the suitability of river designations and effects on other resources contained in Appendix E.

Appendix E has been modified to include an analysis of the suitability of all 112 eligible rivers. These 112 suitability studies consider the factors outlined in Section 4(a) of the Wild and Scenic Rivers Act, as further described in the introduction to Appendix E.

The Supplement preferred alternative (Alternative P) adds eight rivers to the 17 recommended in the June 1990 DEIS, and deletes one river in the DEIS for a total of 24. The Black River on Chichagof Island is no longer recommended in the preferred alternative. This adjustment was based on concerns that designation could impede the development of one of the potentially most productive fisheries improvement projects on Chichagof Island. The seven rivers added to the Supplement preferred alternative were included to provide more comprehensive representation of geographic provinces of Southeast Alaska. These seven rivers are: the Dangerous River on the Yakutat Forelands; the Chickamin River, Santa Anna Creek and Lake, Eagle River and Lake, and Aaron, Oerns and Berg Creeks in the Coast Range geographic province; Kadake Creek and Fall Dog Creek in the Interior Islands geographic province.

The river corridors associated with each of the alternatives in the Supplement are depicted on the alternative maps. After further analysis, several minor changes in the rivers in each alternative have been made to correct errors in mileage and classification from that originally displayed in the DEIS.

In several cases actual adjustments to the mapped river corridor were made where the map in the DEIS Appendix E and the text describing the river did not agree. In a few cases changes were made to include the intertidal lagoons, or salt chucks, for several rivers. In the Supplement, salt chucks with well-defined tidal falls or rapids are now included and all significant map corrections are contained in the Supplement Appendix E.

Due to the presence of previously uninventoried conditions or previously authorizied activities in the long-term sale areas, a few rivers were reevaluated, and portions of a few segments were considered no longer eligible, or changed classification. Salmon Bay Lake tributaries were considered no longer eligible due to approved timber sale offerings and new road construction. The Snakey Lakes portion of the Thorne River was reclassified from "Wild" to "Scenic" due to a more precise location of past road development and timber harvest units and the presence of approved roads and harvest units in the 1989-1994 KPC EIS.

Since the DEIS release, the National Park Service (NPS) has initiated an evaluation to determine the eligibility of rivers within the National Parks and Preserves in Alaska. The Alsek River near Yakutat is included in that evaluation, including the surface and the west bank of an 18-mile segment that are within the Tongass National Forest. They have found the river to be eligible, with the 18-mile segment meeting the "Scenic" classification.

The tables throughout Chapter 3 have been revised to reflect changes in classification, mileage and other information consistent with the additional analysis done since the DEIS.

The Wild River Land Use Designation has been modified to provide direction for removal of hazard and sweep trees which impede navigation on navigable rivers. Direction which allows fish improvements has been made more restrictive on Wild Rivers, consistent with ANILCA which makes no special exceptions in amending the Wild and Scenic Rivers Act.

The Visual Quality Objectives of the Wild River, Scenic River, and Recreational River Land Use Designations have been modified and clarified.

Background

This section describes: 1) the process for identifying rivers that are eligible for inclusion in the National Wild and Scenic Rivers System; 2) the issues and concerns surrounding designation; and 3) provides an inventory of the outstandingly remarkable values and potential classification of eligible rivers. It concludes with discussion of the effects of each alternative on the eligible rivers. A listing and discussion of individual rivers is found in Appendix E.

The Wild and Scenic Rivers Act of 1968 provided a means for recognizing and protecting the outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, ecologic and other values of selected rivers. The intent of including a river in the National Wild and Scenic Rivers System is to preserve the free-flowing condition of the river itself, as well as the characteristics of the river's immediate environment, for the enjoyment and benefit of present and future generations.

The process for adding rivers to the National system includes four steps. First, there is a determination of eligibility; to be eligible the river must be free-flowing and must have at least one outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or ecologic value. This value should be a unique or exceptional representation for the area studied. In the evaluation for the Tongass National Forest, seven geographic provinces representing different geologic, climatic and ecologic conditions were used to determine representation.

Second, the river or its segments are classified according to the criteria in the Wild and Scenic Rivers Act. In Alaska, ANILCA allowed for the continuation of access by airplane, motorboat and other forms of surface transportation, where traditionally employed on all public lands, and for the continuation of fish and wildlife research and other activities within Conservation System Units (which includes Wild and Scenic Rivers). The presence of such existing activities and uses was not considered to affect the potential classification of eligible rivers in this analysis.

- A river is defined in the Wild and Scenic Rivers Act as "a flowing body of water or estuary or a section, portion, or tributary thereof, including rivers, streams, creeks, runs, rills, and small lakes". By inference, a glacier could be considered a flowing body of water (ice), although this interpretation is untested.

- Wild River areas are defined as those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive in character and waters unpolluted. These represent vestiges of primitive America.

- Scenic River areas are defined as those rivers or sections of rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

- Recreational River areas are defined as those rivers or sections of rivers that are readily accessible by road or railroad, that may have undergone some development along their shorelines and that may have undergone some impoundment or diversion in the past.

The third step is the determination that a river is suitable for inclusion in the National system. Suitability refers to how designation of a river fits the overall management for the area, and considers the trade-offs with other resource values. The land manager's estimate of the worthiness of the river to be recommended as a component of the National System, as well as mixed land ownership, State and local government interests and the value of other resources and potential uses, may affect the decision to recommend a river as suitable. The suitability factors are described in general terms in Section 4 of the Wild and Scenic Rivers Act; they are not detailed criteria, are not entirely quantifiable, and no attempt was made to further define these factors, except for the factor relating to whether a river would make a "worthy addition to the National System". For this factor, the study participants were instructed to consider how well the river represented the geographic province in which it is located.

Finally, if a river is considered eligible and suitable it may be recommended by the land-managing agency for designation as a Wild, Scenic or Recreational River. This is a preliminary administrative recommendation. Recommended rivers will be managed, within the existing authorities of the Forest Service, to retain their free-flowing character and outstandingly remarkable values. The preliminary administrative recommendation is forwarded to the Chief of the Forest Service by the Regional Forester as part of the approved Forest Plan. Only Congress can make a Wild and Scenic River designation, as it did for 26 Alaskan rivers in 1980.

In general, compared to rivers in other parts of the United States, there is relatively little detailed information on some aspects of rivers in Southeast Alaska of the type that is typically considered in river studies. There are very few stream gauging stations and flow records. There are very few past or currently active hydroelectric or other water resource development proposals that typically provide great detail for river studies elsewhere. Since few of the rivers receive significant recreational boating use, there are very few river rafting or kayaking publications dealing with Southeast Alaska rivers. Due to the remoteness of many rivers, data on recreation use is extremely limited. While citizens, guides, and resource managers have abundant personal knowledge about some of the rivers, this information is generally not recorded and documented in any consistent way. To the extent such information was available to the Forest Service, it was considered in these suitability studies.

Because so many eligible rivers exist in Southeast Alaska, and because there is strong interest in the State for maintaining options for future infrastructure development, the question of "ripeness" for decision to recommend rivers to the National System was considered. The river study participants concluded that since the Wild and Scenic Rivers Act was formulated against the background of development typical in the Lower 48 states, where the goal of the National System was to preserve some of the relatively few remaining undeveloped rivers, it was not intended that all eligible rivers be recommended even where there is no apparent conflict with other present or foreseeable management needs. As a result, the study team placed significant weight on the suitability factor related to whether the river would make a worthy addition to the National System, with a strong focus on the ability of suitable rivers to represent the geographic diversity of Southeast Alaska. There are seven major geographic provinces in Southeast Alaska (shown on a map in the Research Natural Area affected environment section), differing in geologic development, climate, topography, ecology and other factors. The suitability analysis for each river in Appendix E makes reference to how well the river represents the geographic province in which is located, compared to other rivers in that province. These "exemplary" rivers form the basis for recommendations in the Preferred Alternative.

Current Situation

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) designated 26 rivers in Central and Northern Alaska as components of the National Wild and Scenic Rivers System under the Wild and Scenic Rivers Act of 1968. None of these rivers is within Southeast Alaska or the Tongass National Forest. An additional 12 rivers were designated as "study rivers" by ANILCA, of which only one, the Situk River near the community of Yakutat, is within Southeast Alaska and within the Tongass National Forest.

The Situk River, including the West Fork and Old Situk Creek, was studied in 1983 and found to possess outstandingly remarkable fish, wildlife and recreational values of national significance, but was not recommended for designation. The State of Alaska, Alaska Department of Fish and Game, and other state and local government organizations supported the development of a management plan for the Situk River rather than designation as a Wild and Scenic River. These findings and the decision to not recommend the Situk are considered to be a part of the current Tongass National Forest Land Management Plan; therefore, no additional study of the Situk's eligibility and suitability was conducted during the plan revision.

Rivers on the Tongass National Forest were never considered for inclusion in the National Rivers Inventory maintained by the Department of Interior, National Park Service. As a result, no rivers other than the Situk have been evaluated for their potential eligibility for inclusion in the National Wild and Scenic River System.

There are nearly 900 watersheds on the Tongass National Forest, containing some 42,500 miles of perennial stream. Some 2,000 individual streams and tributaries totaling about 12,000 miles support anadromous fisheries. Of these about 100, the major salmon streams, are responsible for production of more than half of the salmon in Southeast Alaska. The Alaska Department of Fish and Game has identified 64 watersheds as "important," and 19 watersheds as "high quality," for their commercial fish production and sport fishing values, and other wildlife and fish related attributes. Several rivers with a variety of important ecologic features have been identified as potential Research Natural Areas (see the Research Natural Areas section of this chapter).

Several of the Forest's major rivers originate in British Columbia or the Yukon Territory, and are currently subject to international fishery management agreements and other treaties. Some of the major rivers have historically been used as travelways into Canada, including steamboat travel, and are identified by the State as having potential as road corridors connecting Southeast Alaska with Canada. A number of rivers also have a record of prehistoric use for travel and subsistence activities. The State of Alaska claims jurisdiction over the water and stream bed of all "navigable" streams and rivers, which is the subject of longstanding dispute with the Federal government over interpretations of the Statehood Act and ANILCA.

The small size of communities, and (with a few exceptions) the lack of industrial development, has meant that water supply and hydroelectric projects are small and widely scattered. There are no large "mainstem" dams in Southeast Alaska. This lack of development, along with generally high scenic quality, and wildlife and fish habitat values, implies that many streams on the Tongass could be considered as possessing outstandingly remarkable values when compared to rivers in the "lower 48" states.

Only a few rivers have road access, and fewer still have access to both upstream and downstream segments. Many have steep gradients, or numerous barriers to travel, usually in the form of fallen trees. As a result, recreation opportunities that are commonly considered important in defining outstanding recreation value, such as the opportunity to float or kayak a river, are found on only a few rivers or river-lake systems at the present time. Powerboat access is common on the lower reaches of some rivers. Most public use of rivers occurs near

the river's mouths, in bays and estuaries where saltwater provides access by boat to fishing, hunting and viewing opportunities.

Some rivers on the Tongass may present opportunities to represent ecosystems or features not represented by existing components of the National Wild and Scenic Rivers System. Some rivers contain native runs of anadromous fish that have not been altered through management. Some contain the full diversity of anadromous fish species. A few, like the Whiting and Antler Rivers, present unique "fly-in, float out" recreation opportunities. Most are within a temperate coastal rain forest ecosystem and present opportunities in addition to those in Washington, Oregon and northern California to represent this ecosystem in the National system. Several represent active glaciers and glacial geology not found elsewhere in the United States. Some offer the opportunity to represent rivers that flow through the entire vertical range of ecosystems, from alpine tundra to the sea, in a distance of only a few miles. A few present opportunities for international river conservation efforts. Most rivers will retain their opportunities and features whether or not they are designated as a Wild, Scenic, or Recreation River.

Issues and Concerns

The Alaska National Interest Lands Conservation Act gives the State of Alaska the option of developing transportation linkages between communities and to areas outside Southeast Alaska. Some would view designation of Wild and Scenic Rivers as limiting these transportation system development options. At the same time, others see the current lack of development as presenting a unique opportunity to identify and protect potentially eligible rivers before they undergo development. Potential road and utility corridors have been identified in a number of locations containing potentially eligible rivers, including the routes from Haines or Skagway to Juneau; from Wrangell to Canada by way of several river valleys such as the Stikine and Bradfield Rivers; from Juneau to Canada via the Taku River; from Ketchikan to Wrangell; from Ketchikan to Hydaburg via a ferry terminal proposed for Thorne Bay;and from Wrangell to Petersburg with short ferry connections and from Kake to Petersburg.

The State of Alaska claims jurisdiction over submerged lands, including intertidal lands and the beds and water columns of all rivers which were used or "susceptible of use" for navigation for commercial purposes at Statehood in 1959. The issue of whether the Federal reservation of the Tongass National Forest included the submerged lands claimed by the State has never been conclusively resolved. It is not the purpose of a Wild and Scenic River study to determine whether a river meets the various legal tests to be considered navigable, and navigation on the river for commercial purposes does not preclude its inclusion in the National Wild and Scenic Rivers System. In addition the Wild and Scenic Rivers Act provides for the inclusion of non-Federal lands, presumably including submerged lands, within the study corridor, and the question of whether the State or the United States holds title to the beds of streams is immaterial to the river study process. Since Wild and Scenic Rivers are defined by ANILCA as Conservation System Units, non-Federal lands within a designated Wild and Scenic River area are not considered a part of the Unit and such lands are exempt from federal regulations that apply to the Unit.

One of the rivers studied, the Stikine, is subject to an international treaty (Treaty of Washington, May 8, 1871) which guaranteed that the river would "remain forever free and open for the purposes of commerce . . .". In this case, the navigability of the river is not in question. Several other rivers on the Tongass National Forest, including the Taku and Alsek, are subject to other international treaties governing anadromous fisheries.

Development of water and power resources is also an issue in Southeast Alaska. All the communities of Southeast Alaska are dependent on locally-produced electricity, generated by

hydroelectric or diesel generators. There are virtually no options to connect to power grids "outside." Solid fuel generation is impractical due to the lack of rail transportation and the distance to the nearest bulk coal terminal at Seward is 600 miles across the Gulf of Alaska. Natural gas is unavailable and opportunities for pipeline construction are severely limited by the island character of the area, or by ice fields and glaciers along the Canadian border. Although hydroelectric projects are presently small and widely scattered, the high flow and gradient of many large rivers may present significant hydroelectric potential. Despite the fact that the Alaska Power Authority identifies only two of the tentatively eligible rivers as having potential likely to be developed in the next twenty years, some would argue that designation of Wild and Scenic Rivers could limit future development because non-hydroelectric alternatives are virtually non-existent.

Numerous eligible rivers are within the long-term sale areas of the Alaska Pulp Corporation on Chichagof, Baranof, Kuiu and associated islands, and the Ketchikan Pulp Company on Prince of Wales, Revillagigedo and other islands and the Cleveland Peninsula. Designation of rivers in these areas could affect timber supply to these long-term sales, or increase the cost of logging. (In the determination of eligibility, harvest units and roads previously approved in the records of decision for the two long-term sales were considered as in place).

Although fisheries improvement projects are expressly allowed by Forest Service policy (FSH 1909.12 Chapter 8), some may view designation of Wild and Scenic Rivers as potentially limiting the development of fisheries improvement projects, such as fish passes, because of their potential modification to the primitive character of the landscape. At the same time, many people perceive timber harvest and road construction as having adverse effect on salmon-producing streams, and may perceive designation as a means of protecting fishery values. Most of the eligible rivers and streams on the Tongass National Forest support anadromous fisheries and many contribute substantially to the fishing industry.

Many people in Alaska make all or part of their living following a subsistence way of life. While many seek to protect the wildlife habitat and fisheries in important subsistence activity areas, including many eligible river areas, there has historically been little support for additional Congressional land allocations by such persons because they fear that designations such as Wild and Scenic Rivers may attract additional and competing recreation use, or result in additional regulation of activities within the area.

Mineral interests express concern that designation of Wild and Scenic Rivers would limit the future development of mineral resources important to Alaska's economy. Wild River areas are withdrawn from mineral entry (subject to valid existing rights) 1/4 mile either side of the ordinary high water mark of the river. Operating costs for existing mining activities in Wild Rivers could increase due to requirements to minimize impact on the river values. In Scenic and Recreational River areas which remain open to mineral entry, operating costs could also increase as operating plans would be designed to reduce effects on the outstanding values identified. Only a few of the tentatively eligible rivers are within high priority mineralized areas.

Some individuals and organizations have questioned whether ANILCA Section 1326(b) allows the Forest Service to pursue Wild and Scenic River studies. This section prohibits Federal Agencies from undertaking "single purpose studies leading to the establishment of new Conservation System Units" without specific authorization by Congress. Because the Forest Plan Revision is a comprehensive land management planning document for all National Forest resources, subject to other Federal laws requiring the evaluation of rivers, including the National Forest Management Act and the Wild and Scenic Rivers Act Section 5(d), the Forest Service has determined that it is not conducting a single purpose study, and that the inclusion of

the analysis of Wild and Scenic River potential in that document is not in conflict with ANILCA Section 1326(b) and is consistent with the Wild and Scenic Rivers Act.

Inventory, Eligibility and Classification

An evaluation was conducted for the purpose of determining the eligibility, potential classification, and suitability analysis for 112 rivers and streams on the Tongass National Forest.

This process began with an inventory of all areas of the Forest by Forest Service personnel and, as requested, by field personnel of the Alaska Department of Fish and Game and other individuals with knowledge of river resources. The inventory initially included listings of potentially eligible streams compiled from existing information sources, including the Catalogue of Waters Important to Anadramous Fish (maintained by the Alaska Department of Fish and Game, Habitat Division), the 1979 Forest Plan value comparison unit (watershed) ratings for fish, wildlife and recreation, the ADF&G 1983 Sport Fish Habitat Improvement Program ratings of streams, inventoried potential Research Natural Areas, and other special management areas.

From these information sources, as well as from information provided by Forest Service fish biologists, hydrologists and other professionals personally familiar with river resources, streams and rivers that appeared to have potential outstandingly remarkable values were identified. Streams and rivers with possible outstandingly remarkable values were further evaluated following the processes outlined in "Guidelines for Eligibility, Classification and Management of Wild and Scenic Rivers" (U.S. Department of the Interior and U.S. Department of Agriculture, 1982) and in Chapter 8 of Forest Service Handbook 1909.12. Potential outstandingly remarkable fish and wildlife, recreation, scenic, geologic, cultural, historic and ecologic values were examined.

This inventory and evaluation was confined to rivers and streams which are primarily on National Forest System lands. A number of other potentially eligible streams are present in Southeast Alaska but are either wholly or substantially on Native and private lands, State lands (such as the Chilkat River), or lands administered primarily by other Federal agencies, such as the Tsirku River, administered by the Department of Interior, Bureau of Land Management, and the Alsek River, most of which is administered by the USDI National Park Service. These were not included in the inventory and evaluation for the Tongass National Forest.

The evaluation resulted in the determination that 112 rivers with a total length of 1,383 miles are eligible for consideration as components of the National Wild and Scenic River System.

The 112 eligible rivers, their outstandingly remarkable values, and their potential classification are displayed in Table 3-166. Additional information on the characteristics and resources of each of the tentatively eligible rivers is contained in Appendix E.

Table 3-166

Tongass National Forest eligible rivers

River Name	VCU	Wild (Mi.)	Scenic (Mi.)	Rec. (Mi.)	Geographic Province[1]	Outstandingly Remarkable Values: Fish	Wildlife	Recreation	Scenic	Historic/ Cultural	Geology	Ecologic
Aaron, Oems, Berg Creeks	503S	37	-	-	CR	X	X	X	X	-	-	-
Alecks Creek and Lake	405S	5	-	-	SI	X	-	X	-	X	-	-
Alpine Creek (local)	495S	3	-	-	CR	-	-	-	X	-	-	-
Anan Creek	522S	18	-	-	II	X	X	X	-	-	-	-
Andrews Creek	493S	18	-	-	CR	X	X	-	X	-	-	-
Antler River	14C	13	-	-	LC	-	X	X	X	-	X	-
Baird Glacier	482S	20	-	-	CR	-	X	X	X	-	-	-
Bakewell Creek-Badger Lake	826K	9	-	-	CR	X	-	X	-	-	-	-
Benzeman River	347C	14	-	-	NOI	-	-	-	X	-	X	-
Berner's River	12C	10	-	-	LC	X	X	X	X	-	-	-
Big Branch tributary	341C	12	-	-	NOI	-	-	-	X	-	-	X
Big Creek	674K	5	-	-	SI	X	X	X	X	-	-	-
Big Goat Creek and Lake	802K	5	-	-	CR	-	X	X	X	-	-	-
Black River	272C	10	-	-	NOI	X	-	-	X	-	X	X
Blind River	451S	-	-	5	II	X	X	X	-	-	-	X
Blossom River	815K	1	14	-	CR	X	-	-	-	-	-	-
Blue River	787K	26	-	-	CR		X	-	X	-	X	X
Bradfield River East Fork	517S	-	-	19	CR	X	X	-	X	-	-	-
Bradfield River North Fork	514S	-	-	27	CR	X	X	-	X	-	-	-
Canoe Point stream	625K	2	-	-	SI	-	-	-	X	-	-	-
Cascade Creek	486S	5	-	-	CR	X	-	X	X	-	-	-
Castle River	435S	23	-	-	II	X	X	X	-	-	-	-
Cathedral Falls Creek	425S	-	1	-	II	-	-	X	X	-	-	-
Chickamin River	797K	94	2	-	CR	X	X	X	X	X	X	-
Chuck River	76C	15	-	-	CR	X	X	-	X	-	-	-
Dangerous River	377C	16	7	-	YF	-	X	-	X	-	-	-
Duncan Salt Chuck and Creek	441S	12	-	-	II	X	X	X	X	-	-	-
Eagle River	26C	-	-	6	LC	-	-	X	X	X	X	-
Eagle River and Lake	519S	12	-	-	CR	X	-	X	-	-	-	-
Earl West Creek (local)	478S	-	-	9	II	X	-	X	-	-	-	-
Endicott River	66C	21	-	-	LC	-	X	-	X	-	-	-
Essowah Lake and streams	659K	13	-	-	SI	X	X	-	X	-	-	-
Fall Dog Creek (local)	400S	4	-	-	II	X	X	-	X	X	-	-
Falls Creek and McHenry Lake	472S	3	-	-	II	X	-	-	X	-	-	-
Farragut River	90S	29	1	-	CR	X	X	-	X	-	-	-
Fish Creek	806K	-	-	4	CR	X	-	-	-	-	-	-
Fred's Creek	308C	5	-	-	NOI	-	-	-	X	-	X	-
Gambier Bay tributaries	170C	14	-	-	NII	X	-	-	-	-	-	X
Gilkey River	15C	9	-	-	LC	-	-	-	X	-	X	-
Glacial River	314C	10	-	-	NOI	-	-	-	X	-	X	X
Gokachin-Mirror-Low-Fish Cr.	754K	30	-	-	II	X	X	X	X	X	-	-
Granite Creek-Manzoni Lk	800K	8	-	-	CR	-			X	-	-	-
Hamilton Creek	425S	-	20	-	II	X	-	-	-	-	-	-
Harding River	511S	15	1	-	CR	X	X	X	-	-	-	-
Harris River	610K	-	-	7	SI	-	-	X	-	-	-	-
Hasselborg Creek and Lakes	157C	24	-	-	NII	X	X	X	-	X	-	-
Hatchery Creek and Lake	472S	2	-	-	II	X	-	X	-	X	-	-
Herbert River	26C	-	-	6	LC	-	-	X	X	-	-	-

Table 3-166 (continued)

River Name	VCU	Wild (Mi.)	Scenic (Mi.)	Rec. (Mi.)	Geographic Province[1]	Fish	Wildlife	Recreation	Scenic	Historic/ Cultural	Geology	Ecologic
						Outstandingly Remarkable Values						
Hulakon River	786K	6	-	-	CR	X	X	-	X	-	-	-
Humpback Creek and Lake	834K	8	-	-	CR	X	X	-	-	-	-	-
Hunter Bay lakes and streams	694K	19	-	-	SI	X	-	X	-	-	-	-
Irish Creek-Keku Creek	428S	17	-	-	II	X	-	-	-	X	-	-
Johnson Lake and streams	692K	6	-	-	SI	X	-	-	-	-	-	X
Kadake Creek	421S	5	-	18	II	X	X	X	X	X	-	-
Kadashan River	235C	8	-	-	NII	X	X	-	-	-	-	X
Kah Sheets Creek and Lake	434S	9	-	-	II	X	X	X	-	X	-	-
Karta River-Salmon Lake	605K	24	-	-	SI	X	X	X	-	X	-	-
Katzehin River	9C	10	-	-	LC	X	-	-	X	-	X	-
Kegan Lake and streams	684K	9	-	-	SI	X	-	X	X	-	-	-
Keta River	841K	16	-	-	CR	X	-	-	-	-	-	-
King Salmon River	143C	8	-	-	NII	X	X	-	-	-	-	-
Klahini River	790K	27	-	-	CR	-	X	-	X	-	-	-
Klakas Lake and streams	687K	8	-	-	SI	X	X	-	X	-	-	-
Kook Creek and Lake	239C	-	-	2	NOI	X	-	-	-	X	X	-
Kunk Creek and Lake	463S	2	-	-	II	X	X	X	X	-	-	-
Kushneahin Creek	431S	9	-	-	II	X	-	-	-	-	-	-
Kutlaku Creek and Lake	403S	2	-	-	II	X	-	-	-	-	-	-
Lace River	13C	20	-	-	LC	-	X	X	X	-	X	-
LeConte Glacier	491S	6	-	-	CR	-	-	-	X	-	-	-
Lisianski River	249C	5	-	-	NOI	-	X	-	-	-	-	X
Lost River-Tawah Creek	367C	-	-	10	YF	X	X	-	X	-	-	-
Maksoutof River Complex	330C	10	-	-	NOI	-	-	-	X	-	-	-
Marten Lake and Creek	509S	6	-	-	CR	X	X	X	X	-	-	-
Marten River	838K	17	-	-	CR	X	X	-	-	-	-	-
Mud Bay River	193C	5	-	4	NII	X	X	-	X	-	-	
Naha River	742K	17	2	-	II	X	X	X	-	X	-	-
Niblack lakes and streams	683K	5	-	-	SI	X	-	-	-	-	-	-
Nooya Creek	802K	1	-	-	CR	X	X	X	X	-	-	-
Nutkwa streams	686K	12	-	-	SI	X	X	X	X	-	-	-
Olive Creek	469S	3	-	1	II	X	-	X	-	-	-	-
Orchard Creek and Lake	733K	26	-	-	II	X	X	X	X	-	-	X
Patterson River	487S	3	-	4	CR	-	X	X	X	-	-	-
Pavlof River	218C	-	-	10	NII	X	-	X	-	-	-	-
Petersburg Creek	445S	7	-	-	II	X	-	X	X	X	-	-
Porcupine Creek	466S	2	-	-	II	X	X	X	-	-	-	-
Portage Creek	778K	4	-	-	II	-	-	-	-	X	-	-
Punchbowl Creek	803K	1	-	-	CR	-	-	-	X	-	-	-
Red Bluff Bay tributaries	329C	13	-	-	NOI	X	-	X	X	-	X	X
Rudyerd Creek	798K	12	-	-	CR	-	X	X	X	-	-	-
Salmon Bay Lake and streams	534K	4	2	-	SI	X	X	-	X	-	-	-
Salmon River	806K	-	-	10	CR	-	-	-	-	-	X	-
Santa Anna Creek -Lake Helen	526S	4	-	-	CR	X	-	X	-	-	-	X
Sarkar Lakes	554K	14	3	2	SI	X	X	-	X	X	-	-
Scenery Creek	485S	8	-	-	CR	-	-	-	X	-	-	-
Shakes Slough	495S	10	-	-	CR	-	X	X	X	-	-	-
Shipley Creek and Lake	541K	5	-	-	SI	X	X	-	X	X	-	-

Table 3-166 (continued)

River Name	VCU	Wild (Mi.)	Scenic (Mi.)	Rec. (Mi.)	Geographic Province[1]	Outstandingly Remarkable Values: Fish	Wildlife	Recreation	Scenic	Historic/ Cultural	Geology	Ecologic
Sitkoh Creek	244C	-	4	-	NII	X	-	X	-	-	-	-
Sockeye Cr-Hugh Smith Lk	836K	9	-	-	CR	X	-	-	-	-	-	-
Soda Creek and lake	632K	3	-	-	SI	-	-	-	-	-	X	-
Spring Creek-Lk. Shelokum	726K	3	-	-	II	-	-	-	X	-	X	X
Stikine River	492S	-	25	-	CR	X	X	X	X	X	-	-
Taku River-Twin GlacierLk	46C	-	17	-	CR	X	-	-	X	-	-	-
Thorne River-Hatchery Cr	553K	24	-	18	SI	X	X	X	X	-	-	-
Trail River	190C	6	-		NOI	-	-	-	-	-	-	X
Tunehean Creek	428S	8	-		II	X	-	-	-	-	-	-
Unuk River	784K	23	-	-	CR	X	X	X	X	X	-	-
Virginia Lake and Creek	502S	-	9	-	CR	X	-	X	-	-	-	-
Walker Creek and Lake	797K	6	-		CR	X	X	X	X	-	-	-
Ward Creek and Lake	750K	-	-	3	II	X	-	X	-	-	-	-
Whiting River	61C	25	-	-	CR	X	-	X	X	-	-	-
Wilson River and Lake	817K	9	3	-	CR	X	X	-	-	-	-	-
Wolverine Cr. McDonald Lk	724K	6	-		II	X	X	X	-	-	-	-

[1] The geographic provinces are: CR - Coast Range, LC - Lynn Canal, NOI - Northern Outer Islands, NII - Northern Interior Islands, II - Interior Islands, SI - Southern Islands, YF - Yakutat Forelands.

All rivers on the Tongass were initially reviewed for outstandingly remarkable values. The initial evaluation identified 300 rivers and streams for further study. Of these, 188 were determined to not contain outstandingly remarkable values representative of the resource or geographic province. This group of ineligible streams is listed in Table 3-167.

Table 3-167
Further study — ineligible streams

Chatham Area	Ketchikan Area	Ketchikan Area	Stikine Area
Thayer Creek & Lakes	Swan Cove Creek	Gunsight Creek	Portage Creek
Kanaklu Creek & Lake	Dog Salmon Creek	Carroll Creek	Big John Creek
Pleasant Bay Creek	St. Nicholas Creek	Lunch Creek	Lovelace Creek
Windfall Creek (ADM)	Cabin Creek	Falls Creek	Towers Lake streams
Pybus Bay Creek	Klawock River	Licking Creek	Mitchell Creek
Hood Bay Creek(s)	Twelvemile Creek	Calamity Creek	Saginaw Creek
Wheeler Creek	Refugio Creek	Marble Creek	Stream E. of Kutlaku Creek
Green's Creek	Rock Creek	Painted Creek	Kwatehein Creek
Stream(s) in VCU 192	Eek Lake	Robinson Creek and Lake	Rowan Creek
Stream(s) in VCU 193	Hetta Lake	Red River	Streams in VCU 419-421
Stream(s) in VCU 201	Old Tom's Creek	Soule River	Seclusion Harbor streams
Game Creek	Kina Creek	Weasel Creek	Streams in Falls Cr. RNA
Seagull Creek	Hydaburg River	Halibut Bay stream	Muddy River
Admiralty Cr-Youngs Lk	Natzuni Creek	Tombstone Creek	Cat Creek
Yehring Creek	Sunny Creek	Davis River	Streams-West Duncan Uplift
Dayebas Creek	Miller Lake	Stream South of Davis River	Twin Creek
Turner Lake & Outlet Cr	Trocadero Creek	Grace Creek	Harvey Lake outlet
Sandborn River	Cable Creek	Checats Creek	Three Lakes streams
Speel River	Dead Battery Creek	Winstanley Creek	Sumner Creek
Mendenhall River	Beaver Creek	Dicks Creek	Ohmer Creek
Lover's Creek	Old Franks Creek	Texas Creek	Big Creek (Mitkof Island)
Trap River	Maybeso Creek	Nakat streams	N. Arm Creek (Stikine)
Tonalite Creek	Black Bear Lake	Hidden Inlet stream	Kikahe Creek (Stikine)
Goulding River & Lakes	Indian Creek	Kah Shakes stream	Shuktusa Creek
Plotnikof River	Sulzer Creek	Grant Creek	Dog Salmon Cr. (Etolin Island)
Lake Eva & outlet strm	Five Mile Creek	Gwent Cove stream	King George (local)
Suloia Creek	Coho Creek	Karheen Creek	Straight Creek
Baranof River	Lucky Cove Streams	Steelhead Creek	Thoms Creek
Salmon Creek	Spit Creek	Control Creek	Streets Creek
Big Bay Creek	Helm Bay streams	Rio Beaver Creek	3 Way Pass Salt Chuck
Deer Lake Creek	Short Creek-Reflection Lake	Rio Roberts Creek	Trout Creek
Port Krestof Creek	Black Bear Lake	Cutthroat Creek	Craig River
Redoubt River	Cannery Creek	Red Creek	Hoya Creek
Goose Flats River	Vixen Creeks	Trout Creek	Frosty Creek
Fish Bay Creek	Port Stewart streams	Staney Creek	Brownson Island Salt Chuck
Katlian River	Granite Creek	Shaheen Creek	Fools Inlet Streams
Stream(s) in VCU 239	Wasta Creek	Ratz Creek	Crittenden Creek
Stream(s) in VCU 242	Bell Island Creek	Eagle Creek	Tom Creek
Finger Creek	Beaver Creek	Ingot Creek (108 Creek)	VCU 522 streams except Anan
Eagle River (SRD)	Long Creek	Logjam Creek	Twin Lakes Pot. RNA streams
Goon Dip River	Klu Creek	Chuck Lake stream	Kadin Pot. RNA streams
Clear River	Klam Creek	Exchange Creek	S. Etolin Pot. RNA streams
Waterfall Creek & Lake	Wolf Creek	Calder Creek	Pat Creek
Pike Lakes	Neets Creek	Sutter Creek	McCormack Creek
Italio River	Traitors Creek	Nakati Bay streams	
Arhnklin River	Margaret Creek	Goochee Creek	
Ustay R. & Square Lake	Bostwick Creek	Adit Creek	
Akwe River & Triangle Lk	Salt Lagoon Creek	Nossuk Creek	
Tanis River	Buckhorn Creek	Big Creek	

Methodology and Scientific Accuracy

The 1982 Guidelines for Eligibility, Classification and Management of Wild and Scenic Rivers acknowledged that the determination of eligibility is a subjective process which involves the consideration of esthetic and other factors which are not quantifiable. The Guidelines provided general criteria for identifying "outstandingly remarkable" values, and the level of existing development related to classification. The determination of eligibility was made by Forest Service resource professionals in consultation, as necessary, with other agency professionals, as required by the Guidelines.

To guide this process, a general set of criteria was developed, based in part on the criteria used in river studies in the Pacific Northwest. These studies were chosen as a guide because rivers in the Pacific Northwest are most similar to rivers in Southeast Alaska, primarily due to the temperate rainforest, climate, and presence of anadromous fish.

Prior to the commencement of the eligibility determination, the general criteria used for identifying "outstandingly remarkable" values was reviewed by professionals of several Federal and State Agencies including the National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management, Alaska Department of Fish and Game, Alaska Department of Natural Resources and its Division of Parks and Outdoor Recreation.

In addition, a variety of existing information sources were reviewed that provided clues to the probable existence of outstandingly remarkable values. These sources included listings of high-value sport fishing waters, and other materials provided by the Alaska Department of Fish and Game (ADF&G); the task force report for identification of potential Research Natural Areas; detailed reports on high value and important watersheds identified in the ADF&G Forest Habitat Integrity Program of 1982; independent publications containing information on individual rivers personal knowledge of local users.

Wild and Scenic Rivers

Environmental Consequences

Direct, Indirect and Cumulative Effects

The kinds and amounts of activities and changes acceptable within a river corridor depend on whether it is recommended to be designated as a Wild, Scenic or Recreational River. Because Forest Plan alternatives are not site-specific, it is not possible to describe precisely how an individual stream may be affected by future projects, since their exact locations and designs are not yet determined. It is possible, however, to describe and to display the general effects of various management activities on the eligibility and potential classification of rivers. These potential effects are described below in general terms. In Appendix E, the effects of alternatives on each eligible river are described in more detail through the individual river suitability studies.

Specific kinds of forest activities and uses can affect the classification or eligibility of rivers. These are described in the next few paragraphs:

Timber Harvesting. Timber harvesting and associated road and log transfer facilities can have a major effect on the potential for a river to be considered eligible, and, if eligible, which classification it meets. Extensive, highly visible and ongoing timber harvesting within a river corridor could result in the river becoming ineligible for any classification. Where timber harvest maintains the natural appearance of the river corridor as seen from the river and its banks, it may qualify for Scenic classification; more alteration may still be acceptable for a Recreational classification.

Water Project Development. Any major impoundment for water storage or hydroelectric power would cause a river segment to be ineligible. Two of the eligible rivers are under active consideration for such projects at the present time. In the case of hydroelectric proposals that meet the criteria for licensing by the Federal Energy Regulatory Commission (FERC), the Forest Service is not the permitting agency, and serves only in an advisory role to FERC. Depending on their visibility and extent, low dams and diversions, penstocks, transmission lines and other facilities may affect the classification of the river. Where they are visually subordinate, the river may be classified as a Recreational River. Where such features dominate the landscape, the river is likely to be ineligible.

Mining. Large-scale mining activity could result in an eligible river becoming ineligible, or result in its being eligible only in the Recreational classification. Some types of mineral exploration may not affect the classification of a river as Scenic or Recreational, as long as the outstandingly remarkable values and classification objectives are maintained.

Recreation Development. Development of trails, hike-in (or fly-in or boat-in) cabins, and campsites would not affect the Wild classification of a river, nor would continuation of traditional access by motorized equipment. In addition to the above, minor developments such as launch sites and modest recreation sites would not affect the Scenic classification, as long as the development did not greatly alter the primitive character. Development of major recreation sites, boat launches, other visitor facilities, would generally cause a river to meet only the Recreational classification.

Roads. Any construction of roads in the river corridor would eliminate that segment of river from classification as a Wild River. Even roads outside of the river corridor might be incompatible with Wild classification, if they detracted from an outstandingly remarkable value, especially scenic values. Construction of roads and bridges which occasionally cross or reach the river would not affect the classification of a Scenic River, assuming such roads are

infrequent and relatively inconspicuous. In broad valley settings a major road might be compatible with the Scenic classification due to the scale of the landscape. Construction of a major highway or extensive road system could limit a river to the Recreational classification.

Fishery Improvements. Constructed fish passes and other structures associated with improvement of fish habitat are possible in the Wild classification, if determined on a case-by-case basis that the facility does not alter the free-flowing character of the river or conflict with the primitive character of the river area. Some fish improvements typical in Alaska may not be allowed on a Wild River. Construction of an on-stream fish hatchery would be compatible only with the Recreational classification.

Wildlife Habitat Improvements. Manipulation of vegetation or improvements such as fencing or artificial nest structures, would likely be incompatible with Wild classification. They might be compatible with a Scenic designation, as long as the overall primitive and undeveloped character was maintained. Most improvements would be acceptable in a Recreation classification, consistent with the outstandingly remarkable values.

Conversely, designation of a river as a component of the National Wild and Scenic Rivers System can affect the management of various resources. The Wild and Scenic Rivers Act provides that the study boundary includes, at a minimum, the area within 1/4 mile either side of the high water mark of the river. Final boundaries can and do vary from this minimum, but generally follow the 1/4 mile guideline. Congressional designation as a Wild, Scenic or Recreational River in Alaska might result in the establishment of a Conservation System Unit as defined by ANILCA. Where rivers are designated in Wilderness, the Wild and Scenic Rivers Act provides that the most restrictive provisions of the laws apply. Since the two laws differ somewhat, any legislative action should address the specific differences.

Congressional designation as a Wild River results in the area being withdrawn from mineral entry. Scheduled commercial timber harvest is not allowed, and outputs of timber from tentatively suitable forest lands are foregone. Construction of major recreation facilities, roads, powerlines and other features are not allowed. However, if designated as a conservation unit under ANILCA, Title XI defines a process whereby transportation and utility corridors may be allowed. The potential for hydroelectric power generation is also foregone. Within Wilderness, the President may authorize water resource projects, and designation under the Wild and Scenic Rivers Act that would provide an added degree of protection, requiring congressional approval. Some opportunities for fish and wildlife habitat enhancement would also likely be foregone. Congressional designation would not affect the rights of landowners within a Wild River area, except perhaps access constraints. Other restrictions could result from enabling legislation if zoning or other regulatory changes were enacted by local governments. Designation, particularly where tributary streams, important visual features, or outstandingly remarkable values lie outside the 1/4 mile corridor, could affect the management of lands adjacent to a Wild River by requiring more constraints or complimentary land use designations. The Wild and Scenic Rivers Act also requires that upstream water projects may not significantly degrade the river values within the designated segments and that downstream impoundments may not back water up into the designated segments.

Congressional designation as a Scenic River places significant constraints on the management of timber in the river corridor, although timber harvest generally out of view of the river or recreation sites could occur. The area is not withdrawn from mineral entry, but costs of mining could increase as a result of standards to maintain identified values and Scenic River objectives. The potential for hydroelectric power generation is foregone. Construction of major recreation facilities would not occur. Roads, while allowed, could be more expensive as design seeks to minimize the visual impact and the number of bridge crossings. Effects on management of

adjacent lands would be less than for a Wild River, although activities affecting sensitive visual features may be constrained resulting in increased cost or reduced output.

Congressional designation as a Recreational River places fewer constraints on management and development activities, although the potential for new diversions and hydroelectric power generation is foregone. Timber may be harvested, although visual constraints may increase the cost of timber harvest and reduce outputs.

Congressional designation of a system of Wild and Scenic Rivers has many positive effects. The undeveloped nature of the region presents a unique opportunity to identify the very best candidates for addition to the system, and avoid the situation of picking up the leftovers as has often occurred in the rest of the states. The opportunity presents itself to represent a wide range of outstanding values for a variety of geological and ecological settings, on a large geographic scale. A system of rivers would complement the existing conservation units already designated in Southeast Alaska (by Congress), and could recognize the unique social, economic, and development needs through the enabling legislation, as was done in ANILCA.

A system of Wild and Scenic Rivers could open up new marketing opportunities, as is often the result of the attention focused on congressionally designated areas. On a regional scale, this could be used as a tool to capture a larger segment of visitors to further stimulate tourism and the economies of the area. On a local scale, certain communities or service providers could promote different areas and activities, and attract specific market segments of users. Opportunities could vary from primitive experiences to those in more developed settings, and encompass a variety of activities. Promotion of a designated river might be the vehicle for a successful operation. The down side of this marketing opportunity might be too many people, resulting in user conflicts and more regimented managerial controls.

Suitability

Table 3-168 summarizes the number of river segments and miles by classification in each of the alternatives. Table 3-169 displays the allocation of individual streams by classification (Wild, Scenic and Recreational) in the alternatives. In some cases a stream is shown in a Wild classification in one alternative and in a different classification in another. The intent is to show the river in its current (most undeveloped) condition in one alternative, and to provide recognition to state and local infrastructure and transportation system development opportunities and other resource management needs in another alternative, while still indicating the river is suitable to be considered for recommendation as a Wild, Scenic or Recreational River. Appendix E describes in detail the anticipated effects of designation and non-designation alternatives in respect to the six suitability factors referred to in Section 4 of the Wild and Scenic Rivers Act. Alternative C contains no Wild and Scenic Rivers and is, therefore, not included in the following tables.

Table 3-168

Rivers, segments and miles by classification by alternative

Alternative	Number of Segments[1]	Miles of River	Alternative	Number of Segments[1]	Miles of River
Chatham Area			**Ketchikan Area**		
Alternative A			*Alternative A*		
Wild River	23	274	Wild River	38	493
Scenic River	3	37	Scenic River	7	62
Recreation River	6	38	Recreation River	6	32
Alternative B			*Alternative B*		
Wild River	11	104	Wild River	18	313
Scenic River	1	16	Scenic River	4	30
Recreation River	4	32	Recreation River	4	20
Alternative D			*Alternative D*		
Wild River	4	57	Wild River	9	199
Scenic River	0	0	Scenic River	0	0
Recreation River	0	0	Recreation River	2	9
Alternative P			*Alternative P*		
Wild River	6	62	Wild River	4	129
Scenic River	2	24	Scenic River	5	33
Recreation River	0	0	Recreation River	2	20
Stikine Area			**Forestwide Total**		
Alternative A			*Alternative A*		
Wild River	31	307	Wild River	92	1,074
Scenic River	5	56	Scenic River	15	155
Recreation River	8	84	Recreation River	20	154
Alternative B			*Alternative B*		
Wild River	21	207.5	Wild River	50	624.5
Scenic River	9	101.5	Scenic River	14	147.5
Recreation River	7	93	Recreation River	15	145
Alternative D			*Alternative D*		
Wild River	12	103.5	Wild River	25	359.5
Scenic River	3	22.5	Scenic River	3	22.5
Recreation River	6	78	Recreation River	8	87
Alternative P			*Alternative P*		
Wild River	6	68.5	Wild River	16	259.5
Scenic River	5	30.5	Scenic River	12	87.5
Recreation River	5	65	Recreation River	7	85

[1] Number of segments exceeds the number of rivers because some rivers have several segments that qualify in different classifications. All or parts of 112 eligible rivers are represented in the tables.

Table 3-169
Wild and Scenic Rivers by alternative

Eligible River	A	B	D	P
Chatham Area				
Antler River	W-13	-	-	-
Benzeman River	W-14	-	-	-
Berners River	W-10	W-8	-	-
Big Branch Tributary	W-12	-	-	-
Black River	W-10	-	-	-
Chuck River	W-15	W-15	W-15	-
Dangerous River	W-7/S-16	W-7/S-16	-	W-7/S-16
Eagle River	R-6	R-6	-	-
Endicott River	W-21	-	-	-
Freds Creek	W-5	W-5	-	-
Gambier Bay Tributaries	W-14	-	-	-
Gilkey River	W-9	-	-	-
Glacial River	W-10	W-10	W-10	W-10
Hasselborg River	W-24	W-24	W-24	W-24
Herbert River	R-6	R-6	-	-
Kadashan River	W-8	W-8	-	S-8
Katzehin River	W-10	W-8	-	W-8
King Salmon River	W-8	W-8	W-8	W-8
Kook Creek and Lake	R-2	-	-	-
Lace River	W-20	-	-	-
Lisianski River	W-5	W-5	-	W-5
Lost River and Tawah Creek	R-10	R-10	-	-
Maksoutof River	W-10	-	-	-
Mud Bay River	W-5/R-4			
Pavlof River	R-10	R-10	-	-
Red Bluff Bay Tributaries	W-13	-	-	-
Sitkoh Creek	S-4	-	-	-
Taku River	S-17	-	-	-
Trail River	W-6	W-6	-	-
Whiting	W-25	-	-	-
Stikine Area				
Aaron, Oems, Berg Creeks	W-37	S-37	S-21/R-16	S-21/R-16
Alecks Creek and Lake	W-5	W-5	W-5	-
Alpine Creek	W-3	W-3	W-3	-
Anan Creek	W-18	W-17.5/S-.5	W-17.5/S-.5	W-17.5/S-.5
Andrews Creek	W-18	W-18	W-9/R-9	-
Baird Glacier	W-20	W-20	W-20	-
Blind River	R-5	R-5	R-5	R-5
Bradfield River East Fork	R-19	R-19	-	-
Bradfield River North Fork	R-27	R-27	-	-
Cascade Creek	W-5	W-5	W-5	-
Castle River	W-23	W-23	W-12/R-11	-
Cathedral Falls Creek	R-1	-	-	-
Duncan Salt Chuck Creek	W-12	W-4/S-8	W-4	
Eagle River and Lake	W-12	W-12	R-12	R-12
Earl West Creek	R-9	R-9	-	-
Fall Dog Creek	W-4	W-4	-	W-4
Falls Creek and McHenry Lake	W-3	W-3	-	-

Table 3-169 (continued)

Eligible River	A	B	D	P
Farragut River	W-29/S-1	W-29/S-1	-	W-29/S-1
Hamilton Creek	S-20	S-20	-	-
Harding River	W-15/S-1	-	-	-
Hatchery Creek and Lake	W-2	W-2	-	-
Irish, Keku Creeks	W-17	W-17	-	-
Kadake Creek	W-5/R-18	R-23	-	R-23
Kah Sheets Creek and Lake	W-9	W-5/S-4	-	W-5/S-4
Kunk Creek and Lake	W-2	S-2	-	-
Kushneahin Creek	W-9	-	-	-
Kutlaku Creek and Lake	W-2	-	-	-
LeConte Glacier	W-6	W-6	W-6	W-6
Marten Lake and Creek	W-6	W-6	W-5 S-1	
Olive Creek	W-3/R-1	W-3/R-1	-	-
Patterson River	W-3/R-4	-	-	-
Petersburg Creek	W-7	W-7	W-7	W-7
Porcupine Creek	W-2	-	-	-
Santa Anna Creek and Lake	W-4	S-4	-	S-4
Scenery Creek	W-8	W-8	-	-
Shakes Slough	W-10	W-10	W-10	-
Stikine River	S-25	S-25	R-25	-
Tunehean Creek	W-8	-	-	-
Virginia Lake and Creek	S-9	R-9	-	R-9
Ketchikan Area				
Bakewell Creek-Badger Lake	W-9	-	-	-
Big Creek	W-5	W-5	-	-
Big Goat Creek & Lake	W-5	-	-	
Blossom River	W-1/S-14	-	-	-
Blue River	W-26	W-26	W-26	-
Canoe Point Stream	W-2	-	-	-
Chickamin River	W-94/S-2	W-94/S-2	W-94	W-94/S-2
Essowah Lakes and Streams	W-13	W-13	-	-
Fish Creek	R-4	R-4	-	-
Gokachin, Mirror, Fish, Low Creeks	W-30	W-28/S-2	-	-
Granite Creek-Manzoni Lake	W-8	-	-	-
Harris River	R-7	R-7	-	-
Hulakon River	W-6	-	-	-
Humpback Creek and Lake	W-8	-	-	-
Hunter Bay	W-19	W-19	W-10	-
Johnson Lake and Streams	W-6	W-6	-	-
Karta River, Salmon Lake	W-24	W-24	-	-
Kegan Lake and Streams	W-9	W-9	-	-
Keta River	W-16	-	-	-
Klahini River	W-27	-	-	-
Klakas Lake and Streams	W-8	W-8	W-8	-
Marten River	W-17	-	-	-
Naha River	W-17/S-2	W-17/S-2	W-17	W-17/S-2
Niblack	W-5	-	-	-
Nooya Creek	W-1	-	-	-
Nutkwa River	W-12	W-12	-	-

Table 3-169 (continued)

Eligible River	A	B	D	P
Orchard Creek and Lake	W-26	-	-	-
Portage Creek	W-4	-	-	-
Punchbowl Creek	W-1	-	-	-
Rudyerd Creek	W-12	W-12	W-12	
Salmon Bay Lake and Stream	W-4 S-2	-		W-4 S-2
Salmon River	R-10	-	-	-
Sarkar Lakes	W-14/S-3/R-2	-		W-14/S-3/R-2
Shipley Creek and Lake	W-5	W-5	-	-
Sockeye Creek, Hugh Smith Lake	W-9	-	-	-
Soda Creek and Lake	W-3	W-3	-	-
Spring Creek, Shelokum Lake	W-3	W-3	W-3	-
Thorne River, Hatchery Creek	S-36/R-6	S-24/R-6	R-6	S-24/R-18
Unuk River	W-23	W-23	W-23	-
Walker Creek and Lake	W-6	W-6	W-6	-
Ward Creek and Lake	R-3	R-3	R-3	-
Wilson River and Lake	W-9/S-3	-	-	-
Wolverine Creek, McDonald Lake	W-6	-	-	-

Table 3-170 displays the total number of rivers in each alternative, and their representation of the geographic provinces. All of the alternatives provide a mix in representing the range of ecosystems and features typical of the seven geographic provinces of Southeast Alaska, except for Alternative D which represents only five of the seven provinces. In Alternative A the Wild, Scenic and Recreational River land use designation is applied to all 112 tentatively eligible rivers with a total of 1,382 miles. In Alternative B, the Wild, Scenic and Recreational River allocation is applied to 69 eligible rivers with a total of 917 miles. Alternative D applies the Wild, Scenic and Recreational River allocation to 31 rivers with a total of 460 miles. Alternative P applies the allocation to 24 rivers with a total of 432 miles. Alternative C contains no Wild and Scenic Rivers and is not included in the table.

Table 3-170
Number of eligible rivers by alternative, by geographic province

Geographic Province	A	B	D	P
Coast Range	40	21	14	7
Lynn Canal	8	4	0	1
Northern Outer Islands	10	4	1	2
Northern Interior Islands	7	4	2	3
Interior Islands	29	20	9	7
Southern Islands	16	14	5	3
Yakutat Forelands	2	2	0	1
Total Eligible Rivers = 112	**112**	**69**	**31**	**24**

Effects of Designation

In Alternative A, all 112 eligible rivers with 1,383 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 55 rivers with 712.5 miles are in existing Wilderness, National Monuments and legislated LUD II areas. In general, the classification of the recommended rivers outside of these legislated areas is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of 721,989 acres in the National Wild and Scenic Rivers System. It would eliminate the opportunity for major water resource development projects on 1,383 miles of river.

Designation would include some 380,595 acres in existing Wilderness, National Monuments, and legislated LUD II areas. These designations would have little effect on other resource uses, except minerals outside of Wilderness. They would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects, as the President may approve a water resource development in Wilderness. Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to Wild and Scenic Rivers in Wilderness unless the legislation in the specific designation law includes these exceptions. About 271,160 acres would be managed as Wild Rivers outside of existing Wilderness areas, and would be withdrawn from mineral entry.

The rivers in this alternative contain around 57,850 acres of tentatively suitable forest within their corridors that would be allocated to land use designations not allowing timber harvest. For those river corridors adjacent to land use designations allowing timber harvest, restricted harvest would be allowed on 26,250 acres of tentatively suitable forest within the Scenic and Recreation River corridors, and 8,170 acres would be unavailable for scheduled harvest in Wild River corridors.

In Alternative B, 69 eligible rivers with 917 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 31 rivers with 467 miles are in existing Wilderness, National Monuments and legislated LUD II areas. In general, the classification of the recommended rivers outside of these legislated areas is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of around 476,513 acres in the National Wild and Scenic Rivers System. This amounts to 62 percent of the eligible rivers, and 66 percent of the eligible miles. It would eliminate the opportunity for major water resource development projects on 917 miles of river.

Designation would include some 278,857 acres in existing Wilderness, National Monuments, and legislated LUD II areas. These designations would have little effect on other resource uses, except minerals outside of Wilderness. They would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects, as only the President may approve a water resource development in Wilderness. Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to Wild and Scenic Rivers in Wilderness unless the legislation in the specific law includes these exceptions. About 147,090 acres would be managed as Wild Rivers outside of existing Wilderness areas, and would be withdrawn from mineral entry.

The rivers in this alternative contain around 34,780 acres of tentatively suitable forest within their corridors, that would be allocated to land use designations not allowing timber harvest. For those river corridors adjacent to land use designations allowing timber harvest, restricted harvest would be allowed on 24,030 acres of tentatively suitable forest within the Scenic and Recreation River corridors, and 4,660 acres would be unavailable for scheduled harvest in Wild River corridors.

Alternative C does not recommend designation of Wild and Scenic Rivers. With no designation, there are no effects to other resources and uses. In this alternative, the eligible

rivers would be managed in accordance with the land use designations of adjacent lands. Eligible rivers in Wilderness, National Monuments and legislated LUD II areas would likely retain their free-flowing character and outstandingly remarkable values. The 669.5 miles of eligible rivers outside these areas would be subject to various levels of change over time, and retain the opportunity for water resource development.

In Alternative D, 31 eligible rivers with 469 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 20 rivers with 339 miles are in existing Wilderness, National Monuments and legislated LUD II areas. In general, the classification of the recommended rivers outside of these legislated areas is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of around 238,256 acres in the National Wild and Scenic Rivers System. This amounts to 28 percent of the eligible rivers, and 33 percent of the eligible miles. It would eliminate the opportunity for major water resource development projects on 469 miles of river.

Designation would include some 213,380 acres in existing Wilderness, National Monuments, and legislated LUD II areas. These designations would have little effect on other resource uses, except minerals outside of Wilderness. They would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects, as only the President may approve a water resource development in Wilderness. Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to Wild and Scenic Rivers in Wilderness unless the legislation in the specific law includes these exceptions. About 57,210 acres would be managed as Wild Rivers outside of existing Wilderness areas, and would be withdrawn from mineral entry.

The rivers in this alternative contain around 7,240 acres of tentatively suitable forest within their corridors, that would be allocated to land use designations not allowing timber harvest. For those river corridors adjacent to land use designations allowing timber harvest, restricted harvest would be allowed on 2,500 acres of tentatively suitable forest within the Scenic and Recreation River corridors, and 880 acres would be unavailable for scheduled harvest in Wild River corridors.

In Alternative P, 24 eligible rivers with 432 miles were recommended for designation as Wild, Scenic or Recreational Rivers. Of this number, 11 rivers with 220 miles are in existing Wilderness, National Monuments and legislated LUD II areas. In general, the classification of the recommended rivers outside of these legislated areas is highly compatible with the proposed management of adjacent lands in this alternative. Designation would place a total of 238,817 acres in the National Wild and Scenic Rivers System. This amounts to 21 percent of the eligible rivers, and 31 percent of the eligible miles. It would eliminate the opportunity for major water resource development projects on 432 miles of river.

Designation would include some 123,040 acres in existing Wilderness, National Monuments, and legislated LUD II areas. These designations would have little effect on other resource uses, except minerals outside of Wilderness. They would provide an added degree of protection from the development of water and power projects by requiring Congressional approval of such projects, as the President may approve a water resource development in Wilderness. Specific exceptions for management of Wilderness found in ANILCA that are less restrictive would not apply to Wild and Scenic Rivers in Wilderness unless the legislation in the specific law includes these exceptions. About 57,860 acres would be managed as Wild Rivers outside of existing Wilderness areas, and would be withdrawn from mineral entry.

The rivers in this alternative contain around 9,160 acres of tentatively suitable forest within their corridors, that would be allocated to land use designations not allowing timber harvest.

For those river corridors adjacent to land use designations allowing timber harvest, restricted harvest would be allowed on 19,820 acres of tentatively suitable forest within the Scenic and Recreation River corridors, and 6,500 acres would be unavailable for scheduled harvest in Wild River corridors.

Effects of Nondesignation

In general, not designating the eligible rivers will not preclude them from future consideration as additions to the Wild and Scenic Rivers system. Management prescriptions for the land use designations, along with the Forest-wide Standards and Guidelines, will ensure that many of the outstanding qualities remain. Key standards and guidelines include those for Soil, Water, Riparian, Visual Resource, Recreation and Wetlands; stream buffers are also required by the Tongass Timber Reform Act. Exceptions might be when the free-flowing characteristics of the river are changed through water resource developments, or other modifications such as rip rap or major fish improvement projects. However, the potential classification of the eligible rivers may change depending upon the land use designation a particular river falls within.

Nondesignation will allow consideration of a full range of alternatives for various resource activities. These include fish improvement projects, recreation site development, transportation and utility corridors, mineral exploration and development, and timber harvest, consistent with adjacent land use designations. This could result in increased resource outputs, cost savings, and fewer resource impacts as a result of having fewer options.

Eligible rivers that are allocated to the Intensive Development land use designations are likely over time to either become ineligible or to meet only the Recreational classification after implementation of an alternative, depending on site-specific project location and design.

Eligible rivers that are allocated to the Moderate Development LUD's are likely over time to qualify only for the Scenic or Recreational classifications after implementation, depending on site-specific project location and design.

Eligible rivers that are allocated to the Natural Setting or Wilderness LUD's are likely to retain their eligibility and potential classification after implementation. However, unless they are in Wilderness, the river corridors remain open to mineral entry and the development of water resources. Since proposals for these activities cannot be predicted with any accuracy, their potential effect on eligible rivers was not analyzed.

The final outcome of the eligible rivers rests with Congress. The Forest Plan Revision is the vehicle to look at the broad perspective of identifying a reasonable range of representative rivers, along with consideration of the other resource values the forest provides. Appendix E identifies the tradeoffs more specifically for each river. In the meantime, the 112 rivers will be managed in to maintain their values at the highest level of classification identified in Appendix E, until a recommendation is made in the final Environmental Impact Statement.

Wilderness

Affected Environment

Changes Since the DEIS

The major change occurring since the DEIS has been the signing into law of the Tongass Timber Reform Act (in November 1990). The additional Wildernesses designated by this Act are discussed, and the tabular and graphic information updated accordingly.

Background

This section describes existing Wilderness and the general aspects of wilderness management direction in Alaska. For effects of potential new Wilderness designation, see the Roadless Area section. The alternative maps in the map packet display the locations and boundaries of each Wilderness of the Tongass.

On December 2, 1980, through the enactment of Public Law 96-487, the Alaska National Interest Lands Conservation Act (ANILCA), Congress designated 43 areas, totaling 56.4 million acres, as wilderness in Alaska, making them a part of the National Wilderness Preservation System. Included were 5.5 million acres in 14 Wildernesses established on the Tongass National Forest (see Table 3-171). Two of the areas, Admiralty Island Wilderness and Misty Fiords Wilderness, were also designated as National Monuments. Prior to ANILCA there was no designated wilderness on the Tongass.

On November 28, 1990, the President signed Public Law 101-626, the Tongass Timber Reform Act (TTRA). This act amended ANILCA and designated five new wildernesses and an addition to the existing Kootznoowoo Wilderness (see Table 3-171). The six areas added 299,697 National Forest acres to the National Wilderness Preservation System in Alaska, bringing the total to 5.7 million acres in 19 Wildernesses on the Tongass National Forest. Since the areas were added by amendment to Section 703 of ANILCA, they are established for the same purposes and with the same exceptions to the Wilderness Act as the areas initially established by ANILCA (ANILCA exceptions are explained below). Previously, on August 17, 1990, Public Law 101-378, the Admiralty Island National Monument Land Management Act, renamed the Admiralty Island Monument Wilderness the “Kootznoowoo Wilderness.”

Table 3-171

Wilderness Areas on the Tongass National Forest

Name	Total Acres	Non-National Forest Acres	National Forest Acres
Wilderness Areas Established December 2, 1980 by ANILCA			
Kootznoowoo Wilderness (Admiralty Island National Monument)	988,050[1]	32,129	955,921[1]
Coronation Island Wilderness	19,232	0	19,232
Endicott River Wilderness	98,729	0	98,729
Maurelle Islands Wilderness	4,937	0	4,937
Misty Fiords National Monument Wilderness	2,142,907	664	2,142,243
Petersburg Creek-Duncan Salt Chuck Wilderness	46,849	72	46,777
Russell Fiord Wilderness	348,701	0	348,701
South Baranof Wilderness	319,568	0	319,568
South Prince of Wales Wilderness	91,018	22	90,996
Stikine-LeConte Wilderness	449,951	1,025	448,926
Tebenkof Bay Wilderness	66,839	0	66,839
Tracy Arm-Fords Terror Wilderness	653,179	0	653,179
Warren Island Wilderness	11,181	0	11,181
West Chichagof-Yakobi Wilderness	265,529	782	264,747
Wilderness Areas Established November 28, 1990 by TTRA			
Chuck River Wilderness	74,990	692	74,298
Karta Wilderness	39,894	5	39,889
Kuiu Wilderness	60,581	0	60,581
Pleasant-Lemusurier-Inian Islands Wilderness	23,151	55	23,096
South Etolin Wilderness	83,371	0	83,371
Total Acreage	**5,788,657**	**35,446**	**5,753,211**

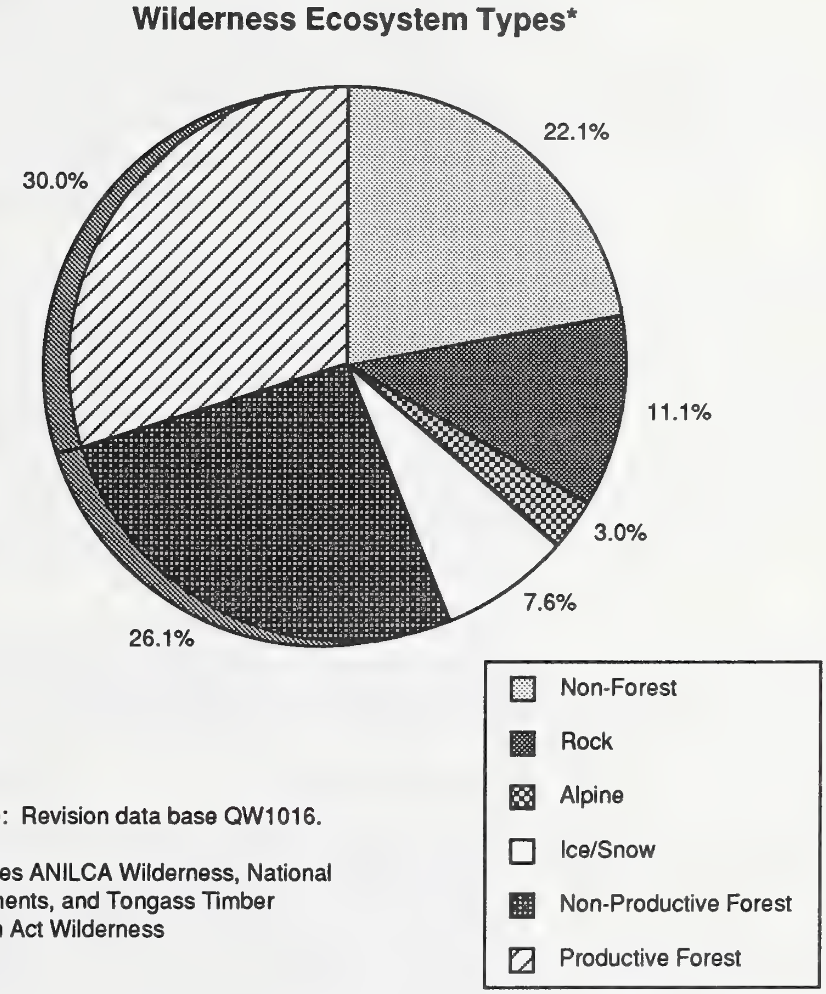
Source: Acreages as reported to Congress with official boundary maps. These acreages may change over time as mining claims or State and Native land selections are patented. These wildernesses include only the public lands above mean high tide.

[1] Kootznoowoo Wilderness includes 18,486 acres, including 24 acres of non-National Forest land, in the Young Lake Addition established by TTRA, November 28, 1990.

Current Situation

The various ecosystems of Southeast Alaska are found within the 19 Tongass Wilderness Areas, including 1.5 million acres of old-growth forest (see Figure 3-47). These areas are representative of the seven geographic provinces of Southeast Alaska, and include glaciers and icefields, offshore islands and seacoasts facing the open Pacific Ocean and inland passages, old-growth temperate rain forests, and major river systems. Two of the largest areas, Kootznoowoo Wilderness and Misty Fiords National Monument Wilderness, contain vast, virtually intact, ecosystems. The wildernesses are mostly in a pristine condition, with the imprint of humans substantially not noticeable. They offer outstanding opportunities for solitude and primitive recreation. Each of the 12 original wilderness areas established in 1980 are described and discussed in detail in the Analysis of the Management Situation, Tongass National Forest, January 1990.

Figure 3-47



Source: Revision data base QW1016.

*Includes ANILCA Wilderness, National Monuments, and Tongass Timber Reform Act Wilderness

The following areas were added to the National Wilderness Preservation System in 1990:

Chuck River

This 72,503-acre area stretches from the Chuck River drainage and upper Windham Bay north to Point Ashley on Holkam Bay (also known as Sumdum Bay) and includes the south side of Tracy Arm. The area is about 10 miles northeast of the community of Hobart Bay and about 70 miles south of Juneau. It is adjacent to the Tracy Arm-Fords Terror Wilderness on the east, and abuts areas of current and planned logging activity on the south and southeast. There are known mineral deposits, including previously-producing mines, and numerous unpatented mining claims. Recreation use has increased with the development of nearby Hobart Bay and private lands within the Chuck River area. Subsistence use is moderate and may increase if Hobart Bay becomes a stable long-term community. Fish habitat values are high and the area is a large producer of pink, chum and coho salmon. Bear and furbearers are important recreational and subsistence resources.

Karta River

This 38,046-acre area includes the drainage of the Karta River system at the head of Kasaan Bay, about five miles from the communities of Kasaan and Hollis. Hollis, about three hours by ferry from Ketchikan, is the only community on Prince of Wales Island served by the Alaska Marine Highway System. The Karta River area contains high value fish habitat for coho salmon. The two major lakes, Salmon Lake and Karta Lake, are important spawning sites for sockeye salmon. One mine previously produced gold, and there are other known mineral deposits. Recreation use is high: the four Forest Service recreation cabins are in such demand that reservations are managed using a lottery system. Subsistence use is also very high.

Kuiu

This area is comprised of 60,576 acres south of the Tebenkof Bay Wilderness on Kuiu Island, about 35 miles south of the community of Kake, and 20 miles from Rowan Bay. Its shoreline is characterized by bays and islands. Fishery values are high, and several bays and anchorages provide fishing and subsistence opportunities for residents of Kake, Port Protection, Point Baker and other communities. The area is currently closed to deer hunting. A portage trail from Affleck Bay crosses the area and provides access to Petrof Bay in the Tebenkof Bay Wilderness.

Pleasant-Lemesurier-Inian Islands

This 23,154-acre area consists of Pleasant Island, Lemesurier Island and the Inian Islands, in Icy Strait between Chichagof Island and Glacier Bay National Park. Although no major fish streams are located on the islands, there is some deer and grouse habitat, and subsistence use does occur.

South Etolin Island

This area comprises 83,642 acres on the south end of Etolin Island and several smaller islands. It is located about midway between Ketchikan and Wrangell on the Inside Passage, and about 15 miles north of the community of Thorne Bay. The area's main attractions are its fish and wildlife values and its value as a popular subsistence use area for the residents of Wrangell. Elk have been introduced to Etolin Island and may have become established within the area. The multitude of small islands and passages provide numerous anchorages for recreation activities, and opportunities for small boat travel. These same features have led to the study of potential sites for mariculture activities.

Young Lake Addition to Kootznoowoo Wilderness.

This 18,173-acre area occupies the drainage of Admiralty Creek on the north end of Admiralty Island, and includes Young Lake and Admiralty Cove. These popular recreation destinations are the site of three public recreation cabins and a trail managed by the Forest Service. The Young Lake area is popular for fishing and deer hunting, and supports abundant brown bear. It is adjacent to a large silver mining operation at Green's Creek. The Admiralty National Monument boundary was also expanded to include this addition to Kootznoowoo Wilderness.

Monitoring has been minimal in most of the wilderness, but has shown some resource damage and user conflict in localized concentrated use areas, indicating a need for increased management presence and for public education on minimum impact camping techniques and appropriate use of wilderness. The very limited monitoring in some of the remote Wildernesses, such as South Prince of Wales and Coronation Island Wildernesses, indicates very little use but some resource damage and occupancy trespass. The areas with the greatest use and most management activities tend to have the greatest need for additional management

direction and standards and guidelines to resolve user conflicts and preserve the wilderness resource.

The Role of Wilderness

Wilderness Act

The National Wilderness Preservation Act of 1964 mandates that designated "wilderness areas…shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness."

Subject to existing private rights, the Act prohibits permanent roads and, except as necessary for realizing the recreation and other wilderness purposes of the area, commercial enterprises. Temporary roads, the use of motor vehicles, motorized equipment, other mechanized equipment, motorboats, the landing of aircraft, and structures and installations are prohibited except as necessary to meet minimum requirements for the administration of the area as wilderness. The Act provides that the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to restrictions by the Secretary of Agriculture. Wildernesses were withdrawn from mineral entry as of December 31, 1983, and patenting of valid claims is limited to subsurface mineral rights.

ANILCA

In ANILCA, Congress reaffirmed and expanded upon the purposes of wilderness as stated in the 1964 Wilderness Act, specifically for wilderness established in Alaska. In recognition of unique situations and established uses in Alaska, ANILCA also provided a number of important specific exceptions to the prohibitions of the Wilderness Act. Some of these follow.

Subsistence policy. Section 811 mandates that the Secretary "shall ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on public lands." This section further directs that, other laws (including the Wilderness Act) notwithstanding, the Secretary "shall permit on the public lands appropriate use for subsistence purposes of snowmobiles, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation."

Special access. Section 1110(a) requires that the Secretary "shall permit" on Conservation Units, which includes Wilderness, "the use of snowmachines (during periods of adequate snow cover or frozen river conditions in the case of wild or scenic rivers), motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and travel to and from villages and homesites." Such use is subject to reasonable regulation but shall not be prohibited unless after notice and hearing the Secretary finds that such use would be detrimental to the resource values of the area.

Inholding access. Section 1110(b) assures adequate and feasible access to State and private land and to valid occupancies including valid mining claims.

Navigation aids and facilities. Section 1310(a) provides that reasonable access to, and operation and maintenance of, existing air and water navigation aids, communication sites, facilities for national defense, and related facilities and existing facilities for weather, climate and fisheries research and monitoring shall be permitted. "Nothing in the Wilderness Act shall be deemed to prohibit such access, operation and maintenance within wilderness areas designated by this Act." Section 1310(b) provides that the establishment, operation and maintenance of new such facilities shall be permitted within wilderness after consultation with

the Secretary and in accordance with mutually agreed upon terms and conditions to minimize the adverse effects within the Unit.

Aquaculture. Section 1315(b) provides that the Secretary may permit fishery research, management, enhancement, and rehabilitation activities within National Forest System Wilderness, in a manner which adequately assures protection, preservation, enhancement and rehabilitation of the wilderness resource. Subject to reasonable regulations, permanent improvements and facilities such as fishways, fish weirs, fish ladders, fish hatcheries, spawning channels, and stream clearance, egg planting and other accepted means of maintaining, enhancing, and rehabilitating fish stocks may be permitted.

Public use cabins. Section 1315(c) provides for the continued use, maintenance and replacement of existing public use cabins within wilderness. Section 1315(d) authorizes the construction and maintenance of a limited number of new public use cabins and shelters, if necessary, for public health and safety, and also requires the Secretary to notify Congress of his intention to remove an existing or construct a new public use cabin or shelter.

Beach log salvage. Section 1315(f) allows the Secretary to permit or otherwise regulate the recovery and salvage of logs from the coastlines of National Forest wilderness and monuments.

Temporary hunting and fishing facilities. Section 1316(a) provides that the Secretary shall permit, subject to reasonable regulation to insure compatibility, the continuation of existing uses and future establishment and use of temporary campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to the taking of fish and game. Facilities and equipment shall be constructed, used and maintained in a manner consistent with the protection of the area where they are located. New facilities shall be constructed of materials which blend with and are compatible with the surrounding landscape. Section 1316(b) allows the Secretary to deny new facilities and equipment upon making a determination, after public notice, that the establishment and use of new facilities or equipment would constitute a significant expansion of existing facilities or uses which would be detrimental to the purposes for which the unit was established, including "wilderness character."

Wilderness Act Applies

In spite of its many exceptions to the Wilderness Act, ANILCA defines "wilderness" as having the same meaning as when it is used in the Wilderness Act (Sec. 102(13)). Further, Sec.707 states that except as expressly provided in ANILCA, Alaskan wilderness "shall be administered in accordance with applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness." Therefore, activities not discussed in ANILCA must be administered in accord with the Wilderness Act just the same as wilderness in other parts of the country.

Other Direction

The Tongass Land Management Plan was completed prior to the enactment of ANILCA. The Tongass Land Management Plan was amended in 1985-86, but the amendment deferred specific management direction to individual wilderness management direction documents. Only five of these had been approved before an appeal of the Stikine-LeConte Wilderness Plan resulted in a decision by the Chief of the Forest Service that modified existing regional direction regarding the use of helicopters by the public (no longer allowed unless the use had been established prior to ANILCA), and the use of chainsaws and generators by cabin permittees (to be phased out) in wilderness. Management direction for the other nine Wilderness areas has not been completed at this time (Analysis of the Management Situation, Tongass National Forest, January 1990).

Implementation of existing direction has varied greatly between the various wildernesses. Some areas, such as Kootznoowoo (formerly Admiralty Islands) and Misty Fiords Wildernesses, have had significant management programs and accomplishments, while others have had minimal management activities. Some of the management activities, such as fisheries enhancement projects and the authorization of temporary facilities for the taking of fish and wildlife, have resulted in administrative appeals by user groups who view these activities as conflicting with their use or with wilderness values.

The opportunity exists through the Forest Plan Revision process to establish a framework of consistent management direction, with standards and guidelines, for all 19 wildernesses. The proposed standards and guidelines (see the Proposed Plan) are responsive to identified public issues and management concerns. Implementation schedules for each of the individual wildernesses can then be prepared to provide area-specific details for implementing these standards and guidelines.

Wilderness

Environmental Consequences

Direct, Indirect and Cumulative Effects

In response to legislative and public proposals for additional Wilderness, last year's Draft Environmental Impact Statement (DEIS) for the Tongass Plan Revision considered a Wilderness allocation alternative in addressing the Wilderness issue. The Tongass Timber Reform Act added additional Wilderness to the Tongass after the release of the DEIS, as previously discussed. No further Wildernesses are recommended as a part of this Supplement.

Implementation of different alternatives would have different effects to the Wilderness resources. In general, those alternatives which allocate more areas to development activities, such as timber harvest and associated road construction, will likely impact adjacent Wilderness values to a higher degree than those alternatives which allocate fewer areas to development activities. These impacts include increases in the sights and sounds of human activity perceived from within the Wilderness, and changes in access patterns. Planning for site-specific projects that could affect Wilderness will consider Wilderness values. Wilderness areas are usually designed to contain their own buffer. Some transition from the edges of the area to the core is likely. However, even within this transition zone Wilderness standards will be maintained.

The principal effect of implementing any of the alternatives will be to apply the Wilderness (WW) and National Monument Wilderness (WM) land use designations to all designated wilderness. The management prescriptions for these land use designations (LUD's) incorporate the management direction provided by the Regional Forester in Region 10 Supplement No. 46, effective February 26, 1990. This supplement, in addition to clarifying and defining the management of ANILCA exceptions in wilderness, also requires the development of a wilderness implementation schedule for each designated wilderness that will apply the standards and guidelines of the LUD management prescriptions to individual areas and situations. The schedule is included in the Proposed Revised Forest Plan.

Application of the standards and guidelines will result in more consistent management of designated wilderness, incorporating the decisions resulting from the Stikine-LeConte Wilderness Management Plan appeal, subsequent direction, and interpretations of ANILCA exceptions. Since the areas already designated as wilderness are withdrawn from mineral entry (subject to valid existing rights), there are no additional effects on other resources and uses, including subsistence activities.

Wildlife

Affected Environment

Changes Since the DEIS

Modifications have been made to three of the habitat capability models for management indicator species (MIS): Sitka Black-tailed Deer, Marten, and Brown Bear.

Sitka Black-tailed Deer

The deer-modeling task group compared the deer model outputs with data from ADF&G pellet group transects and hunter harvest data. In some areas, the deer model outputs appeared too high or too low when compared to these variables. The task group considered which factors in the model caused the erroneously high or low numbers, and the model was adjusted. Snow-depth ratings were changed from high to moderate in some VCU's. Moderate snow-depth ratings in some VCU's were changed to low snow-depth ratings. Deer densities in low snow areas were reduced; deer densities in high snow areas were increased; deer densities in low elevation areas were reduced; deer densities in high elevation areas were increased. The deer-modeling task group reviewed model outputs following these changes and, at the present time, believes the changes made to the deer model better reflect the habitat capability for deer in Southeast Alaska. The deer model used for the Supplement is described in Appendix B.

Marten

The first marten habitat capability model used data on marten densities from other portions of North America because no research on marten had been done in Southeast Alaska. During 1990, the Forest Service and ADF&G began a cooperative marten study on Chichagof Island. Using data from the first year of study, the marten densities in the model were reduced by 32 percent. The marten model used for the Supplement is described in Appendix B.

Brown Bear

In review of brown bear model outputs, ADF&G observed that habitat capability estimates for the mainland appear too high. ADF&G had knowledgeable biologists estimate brown bear populations in selected areas of the mainland and compared these estimates with the model estimates. This comparison indicated that the model may be overestimating habitat capability by 70 percent on the mainland. The ecological reasons why the habitat capability model may be high on the mainland are not known. At the request of ADF&G, the brown bear model habitat capability estimates for the mainland are reduced by 70 percent for the Supplement (reference February 28, 1991 letter from ADF&G).

The environmental consequences of each alternative (estimated by the MIS habitat capability models) are displayed by ADF&G's "wildlife analysis areas" (WAA's) for 1954, the current situation, first and second decades of plan implementation. The environmental consequences for each alternative for the 5th and 15th decades are displayed by Forest Administrative Area, similar to the DEIS, because it is not possible to predict by WAA where projects that far in the future would actually occur.

A new analysis is presented for the NFMA requirements for maintaining well-distributed viable populations.

Background

The first half of this section includes an overview of animal species in Southeast Alaska, a discussion of species identified as management indicator species (MIS) (including the methodology and scientific accuracy of developing MIS habitat capability models), a discussion of the human use of wildlife resources (hunting and trapping), and a discussion of

the existing habitat conditions on the Forest for the MIS. The last half of the wildlife section focuses on the potential effect that implementation of each alternative is projected to have on the habitat conditions and population trends of the management indicator species. The effects analysis assumes fully implemented alternatives, including timber harvest at the allowable sale quantity decadal ceiling. The Current Plan, since 1979, has only harvested about two-thirds of the average annual allowable sale quantity.

Because the Forest Plan is programmatic, it does not actually authorize activities to occur. The effects presented assume that all permissable activities will take place when, in fact, they may not actually take place. Timber harvest since 1979 is a case in point. The effects presented are projected effects of implementation of alternatives.

Overview of Animal Species

The Tongass National Forest provides habitat for 54 species of mammals (this number includes the recently introduced elk on Etolin Island), 231 species of birds and five species of amphibians and reptiles (Taylor, 1979). There are an additional 18 species of marine mammals found in Southeast Alaska which depend entirely on the ocean environment, 45 species of birds which are considered casual or accidental visitors to Southeast Alaska, and three species of amphibians and reptiles which are considered casual or accidental visitors to Southeast Alaska (Taylor, 1979). These species provide many opportunities for consumptive and nonconsumptive use by the public, including commercial, sport, subsistence, and photographic and viewing activities. The Forest is rich in its varied and unique species. Some of the species found on the Forest in abundance are threatened or endangered in other parts of the United States. Table 3-172 summarizes the scientific orders of birds, mammals, reptiles, and amphibians occurring in Southeast Alaska.

Mammals

The abundance and distribution of many of the species in the orders Insectivora, Chiroptera, Lagomorpha, and Rodentia is not well understood. Current knowledge indicates that the species of hares and rabbits (in the order Lagomorpha) are only found on the mainland. Bat species in the order Chiroptera are probably distributed in suitable habitats throughout the islands. Species of Insectivora and Rodentia are found on various islands, but their total distribution and the methods and frequency of dispersal between islands are not totally understood.

Klein (1965) provides a summary of the postglacial mammal distribution patterns in the southern coastal regions of Alaska. The distribution of small mammals in Southeast Alaska may be accounted for with three hypotheses (Klein, 1965):

1. Refugia (areas that were not covered by glaciers during the last ice age) existed in some offshore areas now submerged at least during the Wisconsin glaciation, as well as land connections between islands or between islands and the mainland.
2. The affinities of some species of small mammals occurring on widely separated islands are the result of parallel morphological changes occurring under similar environmental stimuli in postglacial times.
3. Inter-island dispersal of some species of small mammals occurred via Indian canoe in recent times.

None of these hypotheses have been tested, and additional data and research is still needed on the distribution of small mammals in Southeast Alaska.

Cetacea and Pinnipedia. The 22 species in the orders Cetacea (whales, dolphin, and porpoises) and Pinnipedia (seals and sea lions) are often referred to as marine mammals. Some of these species are entirely aquatic and never use land, while other species use land for a

portion of their life requirements. Eight species of whales are listed as endangered under authority of the Endangered Species Act. Information on the endangered whale species is presented in the Threatened and Endangered Species section.

Table 3-172

Number of species occurring in Southeast Alaska by scientific order

Scientific Order	Number of Regular Occurring Species [1]	Number of Occasional Occurring Species [1]	Number of Known or Probable Breeders
Birds			
Gaviiformes (Loons)	4	0	2
Podicipediformes (Grebes)	4	0	0
Procellariiformes (Albatrosses, Fulmars, Petrels)	9	1	2
Pelecaniformes (Cormorants)	2	1	2
Ciconiiformes (Herons, Bitterns)	2	1	2
Anseriformes (Ducks, Geese, Swans)	36 [2]	8	21
Falconiformes(Hawks, Eagles, Falcons)	12	0	8
Galliformes (Grouse, Ptarmigan)	5	1	5
Gruiformes (Cranes, Coots)	3	0	2
Charadriiformes (Shorebirds, Gulls, Alcids)	55	11	25
Columbiformes (Pigeons, Doves)	3	0	2
Strigiformes (Owls)	9	2	3
Caprimulgiformes (Nighthawk)	1	1	0
Apodiformes (Swifts, Hummingbirds)	4	0	3
Coraciiformes (Kingfisher)	1	0	1
Piciformes (Woodpeckers)	6	0	5
Passeriformes (Perching Birds)	75	19	64
Mammals			
Insectivora (Shrews)	4	0	4
Chiroptera (Bats)	6	0	6
Lagomorpha (Hares, Pika)	2	0	2
Rodentia (Mice, Squirrels, Voles)	21	0	21
Cetacea (Whales, Dolphins, Porpoise)	17	1	-
Carnivora (Wolf, Weasel, Bear, Otter, etc.)	15	0	15
Pinnipedia (Seals, Sea Lions)	3	1	3
Artiodactyla (Deer, Moose, Mt Goat, Elk)	4	0	4
Amphibians and Reptiles			
Caudata (Newt, Salamander)	2	1	2
Anura (Toads, Frogs)	3	0	3
Squamata (Snakes)	0	1	0
Chelonia (Turtles)	0	1	0

Source: Taylor 1979

[1] Regular occurring species are those considered rare, uncommon, or common, but which occur annually in Southeast Alaska. Occasional occurring species do not occur annually in Southeast Alaska.

[2] The four subspecies of Canada geese are counted as separate species.

Carnivora. The order Carnivora includes such species as the gray wolf, black bear, brown bear, marten, ermine, river otter, sea otter, and lynx. Many of these species are valuable for their furs, food and nonconsumptive viewing. Because these animals have been hunted and trapped, more is known about their distribution and abundance.

Artiodactyla. The order Artiodactyla includes three species (Sitka black-tailed deer, moose and mountain goat) which are native to Southeast Alaska, and one recently introduced species (elk). Elk were introduced on Etolin Island from a cooperative transplant effort between the Alaska Department of Fish and Game, sportsmens' groups, and the Forest Service. A few elk have now naturally dispersed from Etolin Island to Zarembo Island. These elk populations are very small, and their future viability is uncertain. Sportsmens' groups are interested in transplanting additional elk. Information on the three native species is included later in this section in the discussions on Management Indicator Species.

Birds

Seabirds. Birds in the orders Gaviiformes, Podicipediformes, Procellariiformes, Pelecaniformes, and Charadriiformes are often collectively known as seabirds. Many of these species use the food resources of the ocean and freshwater lakes, and nest on land. Some of these species nest in large concentrations, and are known as colonial nesters.

Waterfowl and shorebirds. Species in Anseriformes, Ciconiiformes, Gruiformes, and Charadriiformes comprise the numerous ducks, geese, swans, and shorebirds which use the bays, estuaries, and wetlands. Millions of waterfowl and shorebirds migrating to and from northern Alaska and Canadian breeding grounds spend part of their migration in Southeast Alaska. Nearly the entire known population of Vancouver Canada geese breeds and remains in Southeast Alaska throughout the year. Winter waterfowl populations vary according to the severity of winters, but the population is likely in excess of 500,000.

Falconiformes. The order Falconiformes includes five species of hawks, four species of falcons, two species of eagles and osprey. Only four breeding pairs of osprey have been documented on the Tongass, all on the Stikine Area. The reasons for so few osprey are not known, but some believe it may be the weather conditions or competition with bald eagles. The Forest supports the largest population of bald eagles in the world. During the 1980's, the estimated adult bald eagle population has increased from 10,000 birds to 12,000 birds, accounting for about 50 percent of Alaska's bald eagle population. There are 32 known nest sites of Peale's peregrine falcon on the Forest, with most of the nests occurring on cliffs facing the ocean. Populations of other species in this order are not known, but most are considered uncommon or rare in overall abundance.

Strigiformes. The order Strigiformes includes eleven species of owls. The great horned owl and short-eared owl are considered the most common owls. The abundance and distribution of owls in Southeast Alaska is not understood.

Galliformes. The order Galliformes includes the upland game birds of blue grouse, spruce grouse, willow ptarmigan, rock ptarmigan, and white-tailed ptarmigan. Blue grouse and rock ptarmigan are common, while the other species are considered uncommon or rare. All of the species are legally hunted, however, no harvest records are available.

Piciformes. Six species of woodpeckers are included in the order Piciformes. These species are the common flicker, red-breasted sapsucker, hairy woodpecker, downy woodpecker, black-backed three-toed woodpecker, and northern three-toed woodpecker. These species are known

as "primary cavity nesters." They excavate cavities in trees for their own use. These cavities are subsequently used by "secondary cavity nesters", which are species that cannot excavate their own cavities, and, therefore, use those excavated by other birds.

Remaining orders. The remaining orders of Columbiformes, Caprimulgiformes, Apodiformes, Coraciiformes, and Passeriformes contain between 104 species. These species use a wide variety of forested and non-forested habitats, and vary in abundance from common to rare. Alaska Region Report Number 82 lists these species with estimated abundance ratings (Taylor, 1979).

Amphibians and Reptiles

Five amphibians are found on the Tongass National Forest, and include: the rough-skinned newt, long-toed salamander, western toad, spotted frog, and wood frog. These species appear to be widely distributed throughout the islands in Southeast Alaska, and locally abundant in suitable habitat (personal communication with Forest biologists). One amphibian and two reptiles are considered peripheral species and include: the Northwestern salamander, Pacific leatherback turtle, and common gartersnake. These peripheral species are on the geographic edge of their distribution and their presence in Southeast Alaska has been recorded only a few times. Reproduction has not been documented.

Management Indicator Species

Management Indicator Species (MIS) are vertebrate or invertebrate species whose population changes are used to indicate the effects of land management activities (USDA Forest Service 1982). MIS are a planning tool to promote more effective management of wildlife and fish habitats on National Forest Lands. Through the MIS concept, the total number of species that occurs within a planning area is reduced to a manageable set of species that collectively represent the complex of habitats, species, and associated management concerns. MIS are used to help establish management goals for species in public demand.

The selection of Management Indicator Species for the Tongass Forest Plan Revision was a two-step process. First, the Alaska Region cooperated with the Alaska Department of Fish and Game (ADF&G), the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) to identify MIS for National Forest Lands in Alaska. This step resulted in the systematic evaluation of all the species occurring on National Forest Lands in Alaska. This systematic evaluation resulted in the identification of 22 wildlife species as potential MIS for use in Regional, Forest, and project level planning. The Alaska Region Technical Publication titled *Management Indicator Species for the National Forest Lands in Alaska* (Sidle and Suring 1986), provides a detailed overview of this step. The 22 wildlife species included: red squirrel, beaver, long-tailed vole, gray wolf, black bear, brown bear, marten, river otter, Sitka black-tailed deer, moose, mountain goat, Vancouver Canada goose, common merganser, northern goshawk, osprey, bald eagle, blue grouse, ptarmigan, red-breasted sapsucker, hairy woodpecker, brown creeper, and orange-crowned warbler.

Second, the Revision interdisciplinary team, in conjunction with the Tongass Forest Supervisors and ADF&G, USFWS, and NMFS, further evaluated the 22 potential MIS wildlife species. These evaluations resulted in the selection of 13 wildlife MIS for the Tongass Forest Plan Revision: mountain goat, Sitka black-tailed deer, river otter, marten, brown bear, black bear, gray wolf, red squirrel, Vancouver Canada goose, bald eagle, red-breasted sapsucker, hairy woodpecker, and brown creeper. Tables 3-173, 3-174 and 3-175 present a general overview of the habitats these species use on the Tongass National Forest.

Table 3-173

Major habitat categories used by the Management Indicator Species

Species	Spruce Hemlock Forest[1]	Deciduous Forest or Shrub[2]	Alpine Tundra[3]	Grass Sedge Meadow[4]	Estuarine[5]	Marsh[6]	Stream & Beach Riverine[7]	Lacustrine Lakes[8]
Red Squirrel	X	-	-	-	-	-	-	-
Black Bear	X	X	X	X	X	-	X	-
Brown Bear	X	X	X	X	X	-	X	-
Marten	X	-	-	-	-	-	X	-
River Otter	X	-	-	-	X	-	X	X
Sitka Black-tailed Deer	X	-	X	-	-	-	-	-
Mountain Goat	X	X	X	-	-	-	-	-
Gray Wolf[9]	-	-	-	-	-	-	-	-
Vancouver Canada Goose	X	-	-	X	X	X	X	X
Bald Eagle	X	-	-	-	X	-	X	X
Red-breasted Sapsucker	X	X	-	-	-	-	-	-
Hairy Woodpecker	X	-	-	-	-	-	-	-
Brown Creeper	X	-	-	-	-	-	-	-

[1] Closed or open forests dominated by Sitka spruce, western hemlock, or a mixture of the two species.

[2] Deciduous forest or tall shrub community dominated by red alder, willow, cottonwood, or other deciduous species.

[3] Includes areas above tree line in Southeast Alaska.

[4] Meadows, coastal grassflats above high tide (often associated with estuarine), and all other upland habitats dominated by grasses and/or sedges.

[5] Fiord and tidal mixed estuaries and associated mudflat habitats and immediately adjacent habitats.

[6] Freshwater and saltwater marshes including tidal marshes, dominated by grasses and sedges.

[7] Freshwater rivers and streams.

[8] Freshwater lakes and ponds.

[9] Gray wolves will use all habitat categories which are utilized by their prey species.

Table 3-174

Relative importance of conifer successional stages and old-growth habitats for the Management Indicator Species [1]

Species & Season[3]	Early Succession 0-25 years	Mid-Succession Stages 26-150 years	150-200 years	Old Growth Stage >200 years[2] < V.C.4	V.C.4	V.C.5	V.C.6+
Red Squirrel (5)	L	L-H	H	L	M-H	M-H	M-H
Black Bear (2,3,4)	M	L	L	M	M-H	M-H	M-H
Brown Bear (3)	L	L	L	M-H	M-H	M-H	M-H
Marten (1)	L	L	L	L	M	H	H
River Otter (2,3)	L	L	M	L	H	H	H
Sitka Black-tailed Deer (1)	L-M	L	L-M	L-M	M	H	H
Mountain Goat (1)	L	L	L	L	M-H	H	H
Gray Wolf (5) 4	-	-	-	-	-	-	-
Vancouver Canada Goose (2,3)	L	L	L	H	H	H	H
Bald Eagle (2,3)	L	L	L	L	H	H	H
Red-breasted Sapsucker (2,3)	L	L	L	L	H	H	M
Hairy Woodpecker (1)	L	L	L	L	L	M	H
Brown Creeper (1)	L	L	L	L	L	L	H

[1] H = Highest importance with highest population densities
M = Moderate importance with moderate population densities
L = Least importance with lowest population densities

[2] Old Growth is divided into the following types: (V.C. = Volume Class)
<V.C.4 = all old growth forest lands less than 8,000 board feet per acre; includes muskeg forest.
V.C.4 = old growth with 8-20,000 board feet per acre.
V.C.5 = old growth with 20-30,000 board feet per acre.
V.C.6+ = old growth with 30,000 + board feet per acre.

[3] Season codes are as follows: 1 = winter, 2 = spring, 3 = summer, 4 = fall, 5 = all year.

[4] Gray wolves will use habitats according to abundance and availability of prey species.

Table 3-175

Relative importance of non-conifer habitats for the Management Indicator Species[1]

Species & Season[2]	Ocean	Estua-rine	Stream	Lake	Cotton-wood	Red Alder	Avalanche Chutes	Muskeg	Alpine	Cliffs Rocks
Red Squirrel (5)	0	0	0	0	L	0	0	0	0	0
Black Bear (2,3,4)	0	H	M-H	0	L	L	M-H	L	L	0
Brown Bear (3)	0	H	M-H	0	L	L	M	L	L-M	0
Marten (1)	0	0	0	0	0	0	0	0	0	0
River Otter (2,3)	H	H	M	M	H	0	0	L	0	0
Sitka Black-tailed Deer (1)	0	0	0	0	0	0	0	0	0	0
Mountain Goat (1)	0	0	0	0	0	0	L	0	L-M	M
Gray Wolf (5)[3]	-	-	-	-	-	-	-	-	-	-
Vancouver Canada Goose (2,3)	L	H	H	H	L	0	0	L	0	0
Bald Eagle (2,3)	H	H	L-H	L-H	M	0	0	0	0	0
Red-breasted Sapsucker (2,3)	0	0	0	0	H	L	0	0	0	0
Hairy Woodpecker (1)	0	0	0	0	L	L	0	0	0	0
Brown Creeper (1)	0	0	0	0	L	0	0	0	0	0

[1] H = Highest importance with highest population densities
M = Moderate importance with moderate population densities
L = Least importance with lowest population densities

[2] Season codes are as follows: 1 = winter, 2 = spring, 3 = summer, 4 = fall, 5 = all year.

[3] Gray wolves will use habitats according to abundance and availability of prey species.

Habitat Capability Models for the MIS (Including Methodology and Scientific Accuracy)

NFMA planning regulations provide the following direction for MIS: "On the basis of available scientific information, the IDT shall estimate the effects of changes in vegetation type, timber age classes, community composition, rotation age, and year-long suitability of habitat related to mobility of MIS" (36 CFR 219.19 (a)(1)). "Planning alternatives shall be stated and evaluated in terms of both amount and quality of habitat and of animal population trends of the MIS" (36 CFR 219.19 (a)(2)). To accomplish this direction, habitat capability models for each of the wildlife MIS were developed using a team of biologists from the FS, ADF&G, and USFWS for each of the MIS species. Each team of biologists worked on the following tasks for each of the MIS:

1. Compile all of the information pertaining to the species in Southeast Alaska. This included research, agency records and data, and personal knowledge.
2. Review applicable research and publications from other areas.
3. On the basis of available scientific information and knowledge, document historical and existing distribution of the species in Southeast Alaska. This was done by identifying VCU's in which the species were present or absent.
4. On the basis of available scientific information and knowledge, identify the seasonal habitat requirements for each MIS, and identify which seasons and/or habitats may be the most limiting or most affected by human activities.
5. Develop habitat capability indexes (HCI) for the habitat variables (or combination of habitat variables) which are believed to affect the habitat capability for the species. The habitat variables considered include: successional stages of forested vegetation, non-forested vegetation, soils, water, landform (such as cliffs), influences of weather (such as snow depth patterns), influences of aspects, influences of elevation, and other factors

which may be applicable to each of the MIS. The HCI values for the habitat variables range from 1.0 for the best habitats for the species to 0.0 for habitats which are not used by the species.

6. Identify other factors which affect the habitat suitability for the species, such as the effects of human disturbance, and the effects of forest stand patch sizes, and the needs of corridors for movements between suitable habitats, etc.
7. Develop population densities associated with each of the HCI values for each of the MIS.
8. Develop a habitat capability model which incorporates the HCI values and associated population densities. The Habitat Capability Models for each of the MIS are presented in Appendix B.

The Habitat Capability Models represent the compilation of available scientific literature and the current knowledge of biologists pertaining to each of the MIS. Some of the models have received more review and testing than others. The deer model has received the most review and testing. Appendix B contains a detailed discussion for each of the MIS Habitat Capability Models; the following discussion presents a brief overview of the habitat relationships for each of the MIS. Some of the strengths and weaknesses of each of the MIS models are also discussed. Though none of the models exactly reflect habitat capability for a particular specie, they are based on current knowledge and best available information. The models have already received some validation checking against game harvest statistics and local field knowledge, and some adjustments have resulted. The models do present a comparative picture of how habitat capability would be likely to change under a given management scenario, and therefore provide reasonable assessments of effects for this programmatic plan, allowing a reasoned choice among the alternatives.

Mountain Goat

Historically, mountain goats in Southeast Alaska were present only on the mainland. Although capable of swimming, they did not naturally disperse from the mainland to the islands. Klein (1963) cites a reference of one mountain goat being observed on Wrangell Island for several years, but a population was never naturally established. Through cooperative transplant work between the Alaska Department of Fish and Game and the USDA Forest Service, mountain goats are now present on many of the islands. Mountain goats are currently found within the following Value Comparison Units (VCU's): 1-32, 38-92, 95-123, 287-302, 311-332, 344-350, 352-356, 374, 375, 378, 384, 385, 390, 391, 393, 394, 482-506, 507-524, 526, 708-730, 734, 744-746, 754, 775-777, 778, 779, 782-823, 826-828, 833-854, 856-858. (See current plan map in the map packet for VCU locations by number.)

Mountain goats represent species using cliffs, alpine and subalpine, and old-growth forest habitats. Hunted populations are sensitive to overharvest and human disturbance. The State of Alaska and Federal Subsistence Board are responsible for the number of mountain goats allowed to be taken for harvest.

The quantity and quality of winter habitat is the most limiting factor for mountain goats in Southeast Alaska, and is the habitat most likely to be affected by Forest management activities (Suring, et al. (1988)). There are about 3.1 million acres (excluding permanent ice fields and lakes) within occupied mountain goat habitat on the Tongass National Forest; 99 percent (3.0 million acres) are classified as roadless; about 13 percent (412,000 acres) are currently classified as productive old growth; about 9,500 acres of productive old growth have been logged since 1954.

Important environmental factors affecting winter habitat suitability and capability are described by Suring, et al. (1988), and are summarized as follows:

Cliffs. Cliffs must be present for an area to be used by mountain goats. Cliffs are defined as slopes greater than 50 degrees.

Distance from cliffs. The area of land within 0-1/4 mile of cliffs has the highest value to goats. Habitat value is lower from 1/4-1/2 mile from cliffs. There is no habitat value for areas greater than 1/2 mile from cliffs.

Location in Southeast Alaska. Habitat use by mountain goats differs between southern and northern Southeast Alaska. The dividing line between southern and northern is Frederick Sound. Non-forested alpine habitats in the northern part of the Forest have higher value than in the southern part because northern alpine habitats are blown free of snow and are available for use.

Aspect. South aspects have the highest value, north aspects the lowest value, and east and west aspects intermediate values as habitat. Snow is deeper and persists longer on northern exposures. Southern aspects receive the highest amount of radiation from the sun, have the lowest snow depths, and the shortest time covered by snow.

Vegetation. The successional stage of the forest vegetation influences the quantity and availability of food during the winter season. Old-growth trees with large dense crowns have the highest value because they intercept the most snow and provide understory forage plants. Lack of snow interception in early successional stages, and lack of forage in middle successional stages reduces their value as habitat.

Patch size, mobility and corridors. Mountain goats have not been identified as a species requiring minimum patch sizes of a particular habitat type. Their habitats consist of steep, broken terrain with a variety of habitat patch sizes and patterns. Similarly, they do not have specific vegetative corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions. Historical evidence suggests that mountain goats do not disperse between islands.

Human disturbance and mortality factors. Goats which are not hunted, such as those found in several National Parks, are very tolerant to human presence. However, goat populations which are hunted are very sensitive to human presence, and poaching and overharvest may occur without carefully administered harvest regulations and enforcement. As human access increases into mountain goat habitat, the habitat capability model estimates a decline in the quality and capability of the habitat.

Methodology and scientific accuracy. Several mountain goat studies have been conducted in Southeast Alaska, and these studies were the basis for the habitat capability model. Some information on the abundance and distribution of mountain goats is available from Alaska Department of Fish and Game hunter and harvest records and surveys. The computer program to run the model on the GIS data base was one of the more complex, and only one run of the model has been done to date; results of running the model were sent to members of the task group who developed it in August 1990, however, no review comments from the task group members have been received. The model identifies old-growth forests as a very important habitat component, yet a substantial mountain goat population resides in Glacier Bay National Park with little if any old-growth forests available.

Sitka Black-tailed Deer

This subspecies occupies the northern-most extreme of black-tailed deer habitat. Sitka black-tailed deer are indigenous to the coastal regions of Southeast Alaska and northwest British Columbia (Regelin, 1979). Deer are strong swimmers, and have occupied all islands of the Alexander Archipelago capable of supporting them, except Forrester Island (Klein, 1963). On the mainland, deep snow and harsh weather conditions affect deer populations; few deer are found on the mainland from Glacier Bay National Park northward. An attempt to introduce deer to the Yakutat area was not successful. Presently, few deer can be found on the islands near Yakutat. At the present time, Sitka black-tailed deer are not found in the following Value Comparison Units (VCU's): 1-15, 18, 19, 21, 26, 28-31, 39-50, 53, 55-67, 71, 72, 76-79, 84, 91-92, 95-114, 116, 118, 119, 121-123, 352-395, 481, 488, 494, 498, 499, 500, 506, 507, 513, 515, 516, 783-790, 794-799, 801-817, 835, 837-853, 856, 867. (Note: deer may be present in these VCU's in low numbers, especially when weather patterns produce lighter than normal winter weather; however, viable deer populations are generally not present.)

Sitka black-tailed deer are the wildlife species receiving the highest sport hunting and subsistence use of terrestrial game species in Southeast Alaska. The State of Alaska and the Federal Subsistence Board are responsible for the numbers of deer allowed to be taken for harvest.

Sitka black-tailed deer represent species using lower elevation old-growth forest habitats during the winter period. The quantity and quality of winter habitat has been identified as the most limiting factor for Sitka black-tailed deer in Southeast Alaska, and the habitat most likely to be affected by Forest management activities (Suring, et al., 1990). There are about 7.0 million acres of forested land (includes all age classes and types of conifer forests) below 1500 feet elevation within occupied deer habitat on the Tongass National Forest; 83 percent (5.8 million acres) are classified as roadless; about 56 percent (3.95 million acres) are currently classified as productive old growth; about 353,700 acres of productive old growth have been logged since 1954.

A deer winter habitat capability model was developed by an interagency task group, and is described by Suring, et al. (1990). This model identifies the following variables in describing the value of winter habitats:

Snow depths/Winter severity. Average winter severity has a direct effect on the distribution and abundance of deer. Mainland areas with high snowfall have fewer or no deer, while outer islands with less snow have higher numbers of deer. A snow depth rating, developed by ADF&G, for each of 867 Value Comparison Units (VCU) on the Forest, was used to describe the average winter conditions for the VCU (Analysis of the Management Situation, 1990). The rating system is defined as follows (Planning records dated August 19, 1988, and February 13, 1989):

- Low Snow - zero days with more than 12 inches of snow on the ground, mean annual snowfall 0-20 inches.
- Moderate Snow - 19 days with more than 12 inches of snow on the ground, mean annual snowfall 20-80 inches.
- Deep Snow - 55 days with more than 12 inches of snow on the ground, mean annual snowfall 80-160 inches.
- Extreme Snow - more than 160 inches of snow; do not have viable deer populations.

Elevation and aspect. Lower elevations are more valuable to deer than are higher elevations. When snow depths at higher elevations become deep, the deer migrate to lower elevations.

North aspects (316 degrees to 45 degrees) have lower value as deer winter range than the other aspects. South aspects below 800 feet in elevation have the highest value for deer winter range. There is no deer winter range value above 1,200 feet on North aspects and 1,500 feet on South, East and West aspects.

Riparian areas. Due to lack of favorable forage, Sitka spruce stands in riparian areas have low value to wintering deer. Deciduous tree stands in riparian areas have no value for wintering deer.

Vegetation. The successional stage of the forest vegetation influences the quantity and availability of food during the winter season. Old-growth forests have the highest value because they intercept snow and provide understory forage plants. Lack of snow interception in early successional stages, and lack of forage in middle successional stages reduce their value as habitat.

Patch size, mobility and corridors. The effect of patch size on the habitat suitability and capability for deer in Southeast Alaska is poorly understood and not well developed at this time. As indicated in the current draft documentation for the deer model (Suring, et al., 1988), this parameter has not been addressed in studies of deer and their habitat in Southeast Alaska. However, the interagency deer modeling task group did develop a patch size relationship (Planning record dated October 12, 1989; Suring, et al., 1988).

Small patches of old-growth winter habitat with resident wolves on larger islands or the mainland offer far less security from wolves. Deer winter range fragmentation into isolated islands of old growth will concentrate deer in predictable areas, reducing predator search time, which may precipitate sharp declines in deer. This hypothesis has been advanced by researchers in British Columbia and Southeast Alaska (Hebert, 1982; VanBallenberghe and Hanley, 1984; Smith, et al., 1986). Old-growth patch sizes 1,000 acres or larger are estimated to provide optimum deer habitat. The interagency task group believes this general relationship is consistent with principles of the theory of island biogeography (Brown and Gibson, 1983; Harris, 1984) and supported by data on mule deer (Picton and Mackie, 1980).

Sitka black-tailed deer are very mobile. Water has not been a barrier to dispersal as deer are found throughout the islands of Southeast Alaska. Deer also disperse through and use a variety of vegetational communities throughout the year; no specific corridor requirements have been identified.

Wolf predation. Predation can act as a significant controlling factor on deer populations. The model reduces deer populations in areas with wolves.

Human disturbance and mortality factors. Even when deer are in hunted populations, they are very tolerant of humans. Additional habitat suitability or capability reductions, resulting from human development and associated disturbance or displacement, have not been identified.

Methodology and scientific accuracy. More studies have been done with deer in Southeast Alaska than any other wildlife species, and these studies form the basis for the habitat capability model. Alaska Department of Fish and Game collects hunting information and conducts pellet group counts on established transects. The deer model has received the most testing and review of all of the MIS habitat capability models. The deer modeling task group compared the deer model outputs with data from ADF&G pellet group transects and hunter harvest data. In some areas, the deer model outputs appeared too high or too low when compared with the other data. The task group considered which factors in the model may be causing the high or low numbers. They adjusted the model coefficients as follows: high snow-depth ratings in some VCU's were changed to moderate snow-depth ratings; moderate snow

depth ratings in some VCU's were changed to low snow-depth ratings; deer densities in low snow areas were reduced; deer densities in high snow areas were increased; deer densities in low elevation areas were reduced; deer densities in high elevation areas were increased. The deer-modeling task group reviewed model outputs following these changes, and at the present time, believes the changes made to the deer model better reflect the habitat capability for deer in Southeast Alaska.

Even with the large amount of study and work done with deer, several important questions can be asked about the deer habitat capability model: 1) Accurate winter weather records are sparse for Southeast Alaska, and most of the snow-depth ratings are based on general knowledge of biologists. The snow-depth ratings have been adjusted to help correct apparent problems with model outputs, thus indicating that actual snow-depth ratings are unknown in many areas. 2) Predation rates on deer by wolves are not known. 3) The effects of old growth patch size on deer habitat capability have not been addressed in studies to date. 4) The vegetation typing which was done for most of the deer studies was independent of the vegetation typing and mapping of the Forest Service. Correlating the two sets of vegetation typing would improve model validation.

River Otter

River otters are associated with coastal and fresh water aquatic environments and the immediately adjacent (within 100-500 feet) upland habitats throughout Southeast Alaska. Their distribution is Forest-wide in suitable habitats.

There is a trapping season on river otters throughout Southeast Alaska. The State of Alaska and the Federal Subsistence Board are responsible for control of trapping.

Food availability and adequate cover are two factors which affect an area's use by otter. Beach morphology (attributes such as type of shoreline, intertidal lengths, type of substrate material) affect the availability of food and cover. Adjacent upland vegetative conditions are also important in providing cover for otters. There are about 772,000 acres of beach and estuary fringe on the Tongass; about 83 percent (643,000 acres) are classified as roadless; about 65 percent (500,000 acres) are currently classified as productive old growth; about 32,400 acres of productive old growth have been harvested since 1954. There are about 954,000 acres of riparian habitat on the Tongass; about 84 percent (801,000 acres) are classified as roadless; about 43 percent (406,000 acres) are currently classified as productive old growth; about 46,000 acres of productive old growth have been harvested since 1954. (Note: Some wilderness areas do not have estuary or riparian resource information, therefore, the total acres, roadless acres, and old growth acres are not fully accounted for.)

A river otter spring habitat capability model based on adjacent upland cover was developed by an interagency task group, and is described by Suring, et al. (1988). Important variables affecting the suitability and capability of habitats for river otter are summarized as follows:

Location/Elevation. Suitable habitat on National Forest land occurs along the coast or beach fringe (defined as 500 feet above mean high tide) and within riparian habitats along rivers, streams and lakes up to 1200 feet in elevation. Riparian habitats from, 0-800 feet in elevation have higher habitat value than those 800-1200 feet in elevation.

Vegetation. The successional stage of the forest vegetation influences the quality of habitat. Old-growth forests have the highest value because they provide canopy cover, large diameter trees and snags, and availability of burrow and den sites. Younger successional stages provide lower quality habitat. Non-forested habitats have no value for river otter according to the model.

Fish abundance. Streams and rivers that produce anadromous and resident fish have higher value as river otter habitat; streams and rivers with no fish have no value as habitat.

Lake size. Lakes greater than 50 acres in size provide more forage opportunities than smaller lakes, and therefore, have higher habitat value.

Patch size, mobility and corridors. River otter habitat use occurs in a "linear" pattern along the coast and along riparian habitats. River otters have not been identified as a species requiring minimum old-growth patch sizes. River otters are mobile, and have dispersed throughout the islands and riparian habitats of Southeast Alaska. Similarly, they do not have specific vegetative corridor requirements, as they travel along the coast and riparian areas through a variety of terrain and vegetative conditions.

Human disturbance and mortality factors. Often observed around boat harbors and other developments along the coast, river otters are very tolerant of human presence. Additional habitat suitability or capability reductions resulting from human disturbance or access have not been developed or documented.

Methodology and scientific accuracy. Several river otter studies have been conducted in Southeast Alaska and these form the basis for the habitat capability model. Alaska Department of Fish and Game collects data on the number of otters trapped. Data on food availability and mapping of beach morphology attributes are not available. Therefore, cover attributes associated with the adjacent upland vegetation were the only habitat parameters available for estimating habitat capability. This is a recognized weakness in the river otter habitat capability model. River otter studies in Glacier Bay National Park illustrate otter use in areas recently deglaciated with early vegetation stages. The season of the year and the habitat factors which are most limiting to river otters have not been identified. Therefore, evaluating the effects of forest management activities on river otter habitats and populations is tenuous until more knowledge is obtained on the factors which currently limit river otters in Southeast Alaska.

Marten

Historically, marten have naturally inhabited the mainland of Southeast Alaska, and natural populations appear to occur on Kuiu, Kupreanof, Mitkof, and Revillagigedo Islands. Through cooperative transplant work between the Alaska Department of Fish and Game and the USDA Forest Service, marten were introduced to Prince of Wales, Chichagof, and Baranof Islands during the years 1930-1950 (Burris and McKnight, 1973; Johnson, 1981). Marten on Admiralty Island may have escaped from a fur farm on nearby Windfall Island in 1918 (Beier, 1987). At the present time, marten are not found within the following Value Comparison Units (VCU's): 33-37, 93, 94, 124, 185, 186, 368, 455-461, 481, 507, 525, 629, 865.

Marten represent species using lower elevation old-growth forest habitats during the winter period. Forest management activities resulting in increasing human access may result in the potential for overtrapping. The State of Alaska and the Federal Subsistence Board are responsible for regulating trapping seasons.

The quantity and quality of winter habitat is the most limiting factor for marten in Southeast Alaska. Winter habitats are also the habitats most likely to be affected by Forest management activities. There are about 8.0 million acres of forested land (includes all age classes and types of conifer forests) below 1500 feet elevation within occupied marten habitat on the Tongass National Forest; 86 percent (6.9 million acres) are classified as roadless; about 56 percent (4.5 million acres) are currently classified as productive old growth; about 342,300 acres of productive old growth have been logged since 1954.

A marten winter habitat capability model was developed by an Interagency task group, and is described by Suring, et al. (1988). This model identifies the following variables in describing the value of winter habitats:

Location/Elevation. Due to lower snow accumulation, habitats at lower elevations have higher value for wintering marten. Coastal habitats (beach fringe) and riparian areas have the highest value for marten, followed by upland habitats below 800 feet in elevation, and habitats between 800 to 1500 feet in elevation. There is no winter habitat value above 1500 feet in elevation.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of cover and forage available for marten during the winter season. Old-growth forests have the highest value because they intercept snow, provide cover and denning sites, and provide habitat for prey species used by marten. Early successional stages do not provide these habitat components and have lower habitat value.

Patch size, mobility and corridors. Marten have been identified as a species which show a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 180 acres, and use declines with decreasing patch size; it becomes zero when patches are less than 10 acres. Patch size includes the acres of all conifer stands from older second growth through old growth. Marten are fairly mobile on land, and movements of up to 25 miles have been documented. Mobility between islands appears to be limited, since they have not naturally dispersed to many of the islands. Conifer corridors make movement and dispersal easier; recommended corridor vegetation requirements include all conifer stands from young sawtimber stands through old growth.

Human disturbance and mortality factors. Timber harvest and other resource development activities require roads. Roads provide additional access for trappers which may result in increased harvests of marten. Marten are easily trapped and can be overharvested (Strickland, et al., 1982), especially where trapping pressure is heavy without restrictive harvest regulations.

Methodology and scientific accuracy. Although marten have been trapped in Southeast Alaska for many years, trapping data has only been systematically collected since the 1984-85 trapping season. Until 1990, no marten studies were conducted in Southeast Alaska. The first marten habitat capability model used data on marten densities from other portions of North America because no research on marten had been done in Southeast Alaska. During 1990, the Forest Service and ADF&G began a cooperative marten study on Chichagof Island. Using data from the first year of study, the marten densities in the first model have been reduced by 32 percent. Some of Chichagof Island had an emergency closure to trapping because of the likelihood of significant overtrapping. A controlled watershed is needed with no trapping for several years before a true correlation of marten densities to habitat conditions can be attained. As the marten study on Chichagof Island progresses, additional knowledge will result in additional changes and refinements to the habitat capability model.

Brown Bear

Although considered the same species, *Ursus arctos horribilis*, is referred to as brown bear in coastal Alaska and grizzly bear in interior areas and the remainder of North America. Records indicate that the current and historical distribution of brown bear in Southeast Alaska are the same. Brown bears are present on the mainland and on the islands north of Frederick Sound. They are occasionally reported on Mitkof and Wrangell Islands south of Frederick Sound, but are not found on any of the other islands in Southeast Alaska. The populations on Mitkof and

Wrangell Islands are not considered to be viable. Brown bear are absent in the following Value Comparison Units (VCU's): 22, 33-37, 68-92, 398-477, 479, 525, 527-707, 731-781, 864, 865, 866.

Brown bear use sea level to alpine habitats and require large expanses of habitat and protection from human disturbances. Some of the highest brown bear population densities in the world are found on the Tongass. There are about 7.9 million acres (excluding rock, permanent ice fields, and lakes) within occupied brown bear habitat on the Tongass National Forest; 96 percent (7.5 million acres) are classified as roadless; about 36 percent (2.85 million acres) are currently classified as productive old growth; about 82,500 acres of productive old growth have been logged since 1954.

The late summer season has been identified as the most critical or limiting period for brown bear (Schoen, et al., 1989). During this season, the bears concentrate along low-elevation valley bottoms and coastal salmon streams. These are the same areas of highest human use and most intense resource development activities. An interagency task group developed a late summer season habitat capability model for brown bear (Schoen, et al., 1989). This model identifies the following variables in describing the value of late summer season habitats:

Location/Elevation. During the late summer season, brown bears use habitats ranging from estuaries and other coastal habitats to riparian, upland and alpine habitats. Estuaries and riparian areas receive the highest use during this period and receive the highest habitat values.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of forage and cover. Non-forested or non-conifer habitats are also used by brown bears. The vegetation types which receive the highest use by brown bears during the late summer season receive the highest habitat values.

Fish abundance. Streams and rivers that produce anadromous fish have the highest value for brown bears, while resident fish streams and streams with no fish have lower values.

Patch size, mobility and corridors. Brown bears have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, and use a wide variety of habitats with a variety of patch sizes and patterns. They are very mobile on land, and there are occasional reports of brown bears swimming between islands. The reason why brown bears are not present on the islands south of Frederick Sound is unknown. They do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions.

Human disturbance and mortality factors. Increases in human activity in an area may result in increased direct human-induced mortality of bears. Increased bear mortality can occur through increased legal hunting activity, illegal kills, wounding loss, and defense of life or property kills (Schoen, et al., 1987b). Table 3-176 displays the number of known brown bear kills not associated with legal hunting seasons. From 1980 to 1989 a total of 120 kills occurred.

Table 3-176

Number of brown bear kills not associated with legal hunting seasons

	Calendar Year									
Unit[1]	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1A	-	-	-	-	-	1	-	-	-	-
1B	-	-	1	-	-	-	-	-	1	-
1C	1	-	-	1	-	1	1	-	-	-
1D	-	1	-	4	1	2	-	-	2	-
3	-	-	-	-	-	-	1	-	-	1
4	9	11	2	8	11	5	7	10	14	4
5A	3	3	-	-	4	4	1	2	2	1
Total	**13**	**15**	**3**	**13**	**16**	**13**	**10**	**12**	**19**	**6**

Source: Alaska Department of Fish and Game letter dated June 21, 1988, and documents delivered on April 17, 1991.
[1] Unit = Game Management Unit (Alaska Department of Fish and Game)

Methodology and scientific accuracy. Several brown bear research projects have been done in Southeast Alaska, and these form the basis for the habitat capability model. Alaska Department of Fish and Game compiles annual hunting data and kills not associated with legal hunting. In review of brown bear model outputs for the DEIS, ADF&G observed that habitat capability estimates for the mainland were too high. ADF&G had knowledgeable biologists estimate brown bear populations in selected areas of the mainland and compared these estimates with the model estimates. This comparison indicated that the model may be overestimating habitat capability by 70 percent on the mainland. The ecological reasons why the habitat capability model may be high on the mainland are not known. At the request of ADF&G, the brown bear model habitat capability estimates for the mainland are reduced by 70 percent for the Supplement. (Reference February 28, 1991 letter from ADF&G).

Black Bear

Records indicate the same historical and current distribution of black bear in Southeast Alaska. Black bear are present throughout the mainland, and on the islands south of Frederick Sound. They are not present in the following Value Comparison Units (VCU's): 22, 124-351, 507, 766-768, 796.

Black bear use sea level to alpine habitats and require large expanses of habitat and protection from human disturbances. However, black bear are not as susceptible to human disturbance as brown bear. There are about 9.4 million acres (excluding rock, permanent ice fields, and lakes) within occupied black bear habitat on the Tongass National Forest; 88 percent (8.3 million acres) are classified as roadless; about 40 percent (3.8 million acres) are currently classified as productive old growth; about 296,700 acres of productive old growth have been logged since 1954.

Habitat suitability and capability have been described for spring, early summer, late summer, fall, and denning seasons (Suring, et al., 1988). The season which is most limiting for black bears has not been identified. The following variables have been identified in describing the value of habitats for black bear:

Location/Elevation. Black bears use habitats ranging from estuaries and other coastal habitats to riparian, upland, and alpine habitats. Estuarine, riparian, and coastal habitats receive the highest use by black bears and receive the highest habitat values.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of forage and cover. Non-forested or non-conifer habitats are also used by black bears. Generally, early forest successional stages and old-growth forests provide the best forage and/or cover for black bears and receive the highest use.

Fish abundance. Streams and rivers that produce anadromous fish have the highest value for black bears, while resident fish streams and streams with no fish have lower values.

Patch size, mobility and corridors. Black bears have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, use a wide variety of habitats with a variety of patch sizes and patterns. They are very mobile on land, and there are occasional reports of black bears swimming between islands. The reason why black bears are not present on the islands north of Frederick Sound is unknown. They do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions.

Human disturbance and mortality factors. Although black bears can adapt to changes in their environment caused by humans, human-related mortality often reduces total density of black bears (Hugie, 1979; Pelton, 1982). Increases in human activity in an area may result in increased direct human-induced mortality of bears. Increased bear mortality can also occur through increased legal hunting activity, illegal kills, wounding loss, and defense of life or property kills (Schoen, et al., 1987b). Table 3-177 displays the number of known black bear kills not associated with legal hunting seasons. From 1980 to 1989 a total of 137 kills occurred.

Table 3-177

Number of Black Bear kills not associated with legal hunting seasons

	Calendar Year									
Unit[1]	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1A	-	4	-	1	6	7	3	6	4	1
1B	-	-	-	-	-	-	-	1	-	-
1C	-	4	2	1	6	5	11	16	3	3
1D	-	-	-	-	-	1	4	-	-	-
2	-	-	2	-	1	3	1	3	5	9
3	-	2	1	1	8	4	1	-	2	4
5A	-	-	-	-	-	-	-	-	1	-
Total	**-**	**10**	**5**	**3**	**21**	**20**	**20**	**26**	**15**	**17**

Source: Alaska Department of Fish and Game letter dated June 21, 1988, and documents delivered April 15, 1991.

[1] Unit = Game Management Unit (Alaska Department of Fish and Game)

Methodology and scientific accuracy. Only one black bear study has been completed in Southeast Alaska. Alaska Department of Fish and Game annually compiles hunting records and known kills not associated with legal hunting. Outputs from the black bear habitat capability model have received limited review.

Gray Wolf

Two Alaskan subspecies of the gray wolf are currently recognized; one of these subspecies is found in Southeast Alaska, and is known as the Alexander Archipelago wolf (Pedersen, 1982; Stephenson, 1989). Records indicate that the historical and current distributions of gray wolves

in Southeast Alaska are about the same. Wolves inhabit the mainland and the islands south of Frederick Sound. Wolves are not present in the following Value Comparison Units (VCU's): 22, 33-37, 124-351, 481, 507, 564-566.

Wolves require an adequate prey base of ungulates, beaver, and salmon. Habitats then must equate to areas capable of supporting that prey base. Wolves use a wide variety of habitats where their prey are present, affecting prey populations in those habitats. Wolves are hunted and trapped in Southeast Alaska.

There are about 9.4 million acres (excluding rock, permanent ice fields, and lakes) within occupied gray wolf habitat on the Tongass National Forest; 88 percent (8.3 million acres) are classified as roadless; about 40 percent (3.8 million acres) are currently classified as productive old growth; about 296,700 acres of productive old growth have been logged since 1954.

Habitat suitability and capability for wolves are tied directly to populations of their principal prey species. A habitat capability model was developed by an interagency task group and is described by Suring, et al. (1988). This model identifies the following variables in describing the value of wolf habitat:

Prey abundance. The assumption is made in this model that wolves will first select large ungulates as prey and utilize beaver as maintenance prey when ungulates are not plentiful (Mech, 1970). As a minimum, 3.7 pounds per day of prey are required to maintain a wolf (Mech, 1970). The normal amount of prey consumed by wolves ranges from 5.5 pounds to 13.9 pounds per day (Mech, 1974).

Social factors. Due to social interactions, wolf densities do not exceed certain levels even when prey abundance is high. Densities of 0.1 adult wolf per square mile are considered high (Paradiso and Nowak, 1982). This density has been generally accepted as the saturation point beyond which wolf populations would not expand (Pimlott, 1967; Mech, 1970).

Patch size, mobility and corridors. Wolves have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, utilize a wide variety of habitats with a variety of patch sizes and patterns. Wolves are very mobile. Their natural distribution on the islands south of Frederick Sound illustrates their ability to swim between islands. The reason for their absence on the islands north of Frederick Sound is unknown; one theory is that the high densities of brown bear on the islands north of Frederick Sound may be a factor controlling the presence of wolves. They do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions.

Human disturbance and mortality factors. Wolves are legally harvested in Southeast Alaska. Although access and increased human activity may result in increased wolf mortality, additional reduction in habitat suitability or capability as the result of human disturbance or access have not been developed or documented for Southeast Alaska. Road management (i.e., closing roads to reduce mortality) and increased regulation of legal harvests are management approaches to reduce unacceptable mortality levels.

Methodology and scientific accuracy. Several wolf studies have been conducted in Southeast Alaska, and data from these studies was used in development of the habitat capability model. Wolf harvest data is compiled by the Alaska Department of Fish and Game. No studies have been conducted in Southeast Alaska to analyze predation rates of wolves on their prey populations. The habitat capability model only analyzes the abundance of ungulate species in estimating habitat capability; there is no data or analysis on other prey species such as beaver or salmon which can contribute significantly to habitat capability. There is also no data or

analysis on the relationship between sport/subsistence harvesting of prey populations and wolf predation rates and how the combination of the two affect the prey populations and subsequently wolf populations.

Red Squirrel

Before 1930 and 1931, red squirrels existed only on the mainland of Southeast Alaska. In 1930 and 1931 they were introduced to Baranof and Chichagof Islands as a potential prey species for the introduced marten (Burris and McKnight, 1973). Today, red squirrels are currently abundant on many of the islands and the mainland. Red squirrels are not present in the following Value Comparison Units (VCU's): 527-707, 865, 866.

Red squirrel populations require stands with cone-producing trees and cavities in trees and snags. They represent a species which can do fairly well in seed-producing second-growth timber stands. There are about 8.4 million acres of forested land (including all age classes and types of conifer forests) within occupied red squirrel habitat on the Tongass National Forest; 90 percent (7.6 million acres) are classified as roadless; about 51 percent (4.3 million acres) are currently classified as productive old growth; about 181,000 acres of productive old growth have been logged since 1954.

A red squirrel habitat capability model was developed by an interagency task group, and is described by Suring, et al. (1988). This model identifies the following variables in describing red squirrel habitat:

Elevation. Habitat usually does not exist for red squirrels above 2000 feet in elevation; habitat value from 1500 to 2000 feet in elevation is lower than at elevations below 1500 feet.

Vegetation. Tree species and successional stages of forest stands affect the quality of habitat for red squirrels. Spruce trees and mature to old-growth forests have the highest values for red squirrel habitat.

Patch size, mobility and corridors. Red squirrels have been identified as a species which show a habitat/use relationship with the size of their preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 30 acres, and use declines with decreasing patch size and approaches zero when patches are less than three acres. Patch size includes the acres of all cone-producing conifer stands. Apparently large expanses of water are barriers to red squirrels, as evidenced by the fact that red squirrels were not present on islands in Southeast Alaska until they were transplanted on the islands. However, they are found throughout the mainland, and are present in early successional stages of vegetation in Glacier Bay National Park, suggesting that they have the ability to disperse through a variety of vegetational communities and across rivers. Corridors of pole timber or older stands of trees facilitate movement and dispersal.

Human disturbance and mortality factors. No documentation exists on reductions in red squirrel habitat suitability and capability due to human access and/or disturbance.

Methodology and scientific accuracy. No research on red squirrels has been done in Southeast Alaska. The habitat capability model was developed using literature from other North American research, and the knowledge of local biologists. Outputs of the model have received limited review.

Bald Eagle

Bald eagles are found throughout Southeast Alaska. They are primarily associated with coastal habitats and inland riparian habitats. Historical and current distributions are the same.

Some of the highest bald eagle populations in the world are found in Southeast Alaska. Their nesting habitat is primarily old-growth trees along the coast and within riparian areas. Some limited cliff nesting has been documented in Glacier Bay National Park.

The U. S. Fish and Wildlife Service has conducted adult bald eagle population surveys for the years 1967, 1977, 1982, and 1987. Adult population estimates for these surveys are: 1967 - 7,230; 1977 - 7,329; 1982 - 10,933; 1987 - 12,074 (Jacobson, 1989). Most of the data collected in Southeast Alaska has primarily been on nesting habitat. The U.S. Fish and Wildlife Service maintains locations of all identified bald eagle nests; their records have identified 7,022 nest sites as of December 1988. About 98 percent of these nest sites have been found along the coast, with the remaining two percent located along rivers and lakes. Not all of the coastline and rivers and lakes have been surveyed for bald eagle nests.

There are about 772,000 acres of beach and estuary fringe on the Tongass; about 83 percent (643,000 acres) are classified as roadless; about 65 percent (500,000 acres) are currently classified as productive old growth; about 32,400 acres of productive old growth have been harvested since 1954. There are about 954,000 acres of riparian habitat on the Tongass; about 84 percent (801,000 acres) are classified as roadless; about 43 percent (406,000 acres) are currently classified as productive old growth; about 46,000 acres of productive old growth have been harvested since 1954. (Note: Some wilderness areas do not have estuary or riparian resource information, therefore the total acres, roadless acres, and old growth acres are not fully accounted for at this time.)

An interagency task force developed a nesting habitat capability model for bald eagles in Southeast Alaska (Suring, et al., 1988). This model identifies the following variables in describing the value of nesting habitat:

Location. Coastal habitats have been identified as having the highest value for nesting bald eagles. Riparian habitats around rivers and lakes have lower value. Habitats outside the coastal and riparian areas have no value for nesting bald eagles.

Elevation. Most nest sites are located below 800 feet in elevation; above this elevation, there is little to no nesting habitat value.

Stream class. Rivers and streams with anadromous fish (Class I streams) have higher value for nesting bald eagles than rivers and streams with resident fish (Class II streams). Streams with no fish have no value for bald eagles.

Lake size. Lakes larger than 50 acres have higher habitat value than those less than 50 acres.

Vegetation. Spruce trees are preferred over other tree species. Mature and old-growth stands provide the large trees selected by eagles for nest sites.

Patch size, mobility and corridors. Bald eagles nest on almost every island size with suitable nesting habitat. They are very mobile, and seasonally migrate to areas of forage abundance (for example, the large concentration of bald eagles along the Chilkoot River during the winter season forage on late runs of salmon). They have not been identified as needing particular patch sizes or vegetative corridors for movement or dispersal.

Human disturbance and mortality factors. Human activities around nest sites, winter roosting areas, and other bald eagle use areas may temporarily displace eagles or cause them to abandon the site. The U.S. Fish and Wildlife Service and the USDA Forest Service maintain an interagency agreement for bald eagle habitat management in the Alaska Region. This interagency agreement provides management standards and guidelines regulating human disturbance within identified bald eagle use areas.

Methodology and scientific accuracy. Several bald eagle studies (primarily dealing with nesting habitat) have been done in Southeast Alaska, and these form the basis for the habitat capability model. The U.S. Fish and Wildlife Service has an ongoing monitoring and population survey program, which greatly added to the knowledge of bald eagles in Southeast Alaska. Nesting habitat has not been determined to be limiting bald eagle populations in Southeast Alaska. There are other factors which indicate that more than just the availability of suitable nest trees affects the abundance and distribution of bald eagles. For one, nest survey data from the U.S. Fish and Wildlife Service illustrate that nest densities along the coast range from 0 nests per mile to 10.4 nests per mile of shoreline to zero nests per mile of shoreline, and this range is not solely the result of the presence or absence of suitable nest trees.

Red-breasted Sapsucker

The breeding range of the red-breasted sapsucker extends from northern Southeast Alaska through western British Columbia and into western Washington and Oregon (Howell, 1952). This sapsucker is found throughout Southeast Alaska during the spring, summer and early fall seasons, and winters in the coastal portion of its breeding range as far north as Prince of Wales Island (Howell, 1952; Howell, 1953).

Red-breasted sapsuckers are summer residents which require old-growth forest habitats with snags. They are called primary excavators because they excavate cavities for other cavity-using wildlife species. There are about 9.9 million acres of forested land (includes all age classes and types of conifer forests) within occupied red-breasted sapsucker habitat on the Tongass National Forest; about 51 percent (5.05 million acres) are currently classified as productive old growth; about 358,400 acres of productive old growth have been logged since 1954.

Since the red-breasted sapsucker is migratory, and is present throughout Southeast Alaska only during the breeding season, a breeding habitat capability model was developed by an interagency task group, and is described by Suring, et al. (1988). The quantity and quality of suitable breeding habitat has been identified as the habitat most likely to be affected by Forest management activities. The task group notes, however, that breeding habitat may not be the limiting factor for the specie's population, as the quantity and quality of winter habitat in other portions of its range may ultimately be the limiting factor for the population.

Quantity of snags has a direct relationship with the size of red-breasted sapsucker population in an area. Table 3-178 displays this relationship.

Table 3-178

Number of snags required per 100 forested acres to support various percentages of maximum Red-Breasted Sapsucker populations in Southeast Alaska [1]

Percent of Max. Population	Number of Snags [2]
100	160
90	144
80	128
70	112
60	96
50	80
40	64
30	48
20	32
10	16

Source: Suring, et al., 1988.

[1] Forested acres refers to all lands capable of supporting 10 percent tree cover.

[2] Soft and hard snags which are greater than or equal to 15 inches diameter at breast height (DBH), and greater than or equal to 10 feet in height.

Although a Forest-wide inventory on the number of snags does not exist, research and timber stand examinations in Southeast Alaska have identified which forest types and successional stages provide the most favorable red-breasted sapsucker nesting habitat. Suring, et al. (1988) identifies the following variables in describing the value of sapsucker breeding habitat:

Vegetation. The successional stage of the forest vegetation directly relates to the quantity, quality and long-term supply of snags. Old-growth forests provide the best snag habitat over the long term. Lower volume classes of old growth have been found to receive higher use by sapsuckers than higher volume classes. Muskeg forests generally have small diameter, widely-spaced trees that are not preferred by sapsuckers. Black cottonwood (*Populus trichocarpa*) forests may provide suitable nesting sites, and limited forage opportunities early in the year before sap is available. Due to their small tree diameters, red alder (*Alnus rubra*) forests tend to provide limited nesting sites.

Elevation. Forest stands over 2000 feet in elevation are not considered valuable as habitat for red-breasted sapsuckers.

Patch size, mobility and corridors. Red-breasted sapsuckers have been identified as a species which show a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 250 acres, and use declines with decreasing patch size and becomes zero when patches are less than five acres. Patch size includes the acres of all old-growth conifer stands and mature to old-growth black cottonwood stands. Since sapsuckers migrate across open water and many vegetation types to get to winter and summer areas, it is not believed that they require specific vegetative corridors.

Human disturbance and mortality factors. Reductions in habitat suitability and capability due to disturbance and mortality caused by humans have not been identified for the red-breasted sapsucker.

Methodology and scientific accuracy. Only one study has been conducted in Southeast Alaska which collected data on red-breasted sapsuckers. This one study forms the basis for the habitat capability model, although it may not represent average years or average conditions for Southeast Alaska. Breeding habitat may not be the limiting factor for the specie's population, as the quantity and quality of winter habitat in other portions of its range may ultimately be the limiting factor for the population.

Hairy Woodpecker

Associated with snags and partially dead trees for foraging and nesting, the hairy woodpecker is considered an uncommon, permanent resident throughout Southeast Alaska (Sidle and Suring, 1986).

Hairy woodpeckers require old-growth forest habitats with snags. Like the red-breasted sapsucker, hairy woodpeckers are primary cavity excavators for other cavity-using wildlife species. Their winter habitat may be their most limiting. There are about 9.9 million acres of forested land (includes all age classes and types of conifer forests) within occupied hairy woodpecker habitat on the forest; about 51 percent (5.05 million acres) are currently classified as productive old growth; about 358,400 acres of productive old growth have been logged since 1954.

Winter roosting and foraging habitats have been suggested as the limiting factors for resident cavity-nesting birds (Raphael and White 1984; Haapanen, 1965). An interagency task group developed a winter habitat capability model for Southeast Alaska (Suring, et al., 1988).

Snag quantity has a direct relationship with the potential of an area to support hairy woodpeckers. Table 3-179 displays this relationship.

Table 3-179

Number of snags required per 100 forested acres to support various percentages of maximum Hairy Woodpecker populations in Southeastern Alaska[1]

Percent of Max. Population	Number of Snags[2]
100	672
90	605
80	538
70	470
60	403
50	336
40	269
30	202
20	134
10	67

Source: Suring, et al., 1988.

[1] Forested acres refers to all lands capable of supporting 10 percent tree cover.

[2] Soft and hard snags which are greater than or equal to 15 inches dbh and greater than or equal to 10 feet in height.

A Forest-wide snag inventory does not exist. Research and timber stand examinations in Southeast Alaska have identified which forest types and successional stages provide the most favorable nesting habitat for hairy woodpeckers. Suring, et al. (1988) identify the following variables in describing the value of hairy woodpecker breeding habitat:

Vegetation. The successional stage of the forest vegetation has a direct relationship to the quantity, quality, and long-term supply of snags. Old-growth forests provide the best long-term snag habitat. Higher volume old-growth stands have been found to receive higher use by hairy woodpeckers than have lower volume stands.

Elevation. Forest stands above 1500 foot elevation are not considered valuable as winter habitat for hairy woodpeckers.

Patch size, mobility and corridors. Hairy woodpeckers have been identified as a species which shows a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 500 acres, and use declines with decreasing patch size and becomes zero when patches are less than 10 acres. Patch size includes the acres of all old-growth conifer and late succession conifer stands. Hairy woodpeckers appear to be found in suitable habitats throughout the islands of Southeast Alaska, indicating an ability to disperse across water. Specific vegetative corridor requirements have not been identified for the hairy woodpecker.

Human disturbance and mortality factors. Reductions in habitat suitability and capability due to mortality and disturbance caused by humans have not been identified for the hairy woodpecker.

Methodology and scientific accuracy. Only one study has been conducted in Southeast Alaska which collected data on hairy woodpeckers. This study forms the basis for the habitat capability model. This one study may not represent average years or average conditions for Southeast Alaska. Winter habitat has been suggested as the most limiting factor for hairy woodpeckers, however, studies during other seasons of the year are needed to verify the winter habitat limiting assumption.

Brown Creeper

Associated with large, old-growth trees, the brown creeper is considered an uncommon, permanent resident throughout Southeast Alaska (Sidle and Suring, 1986). This species is most dependent on high volume old growth. There are about 9.9 million acres of forested land (includes all age classes and types of conifer forests) within occupied brown creeper habitat on the forest; about 51 percent (5.05 million acres) are currently classified as productive old growth; about 358,400 acres of productive old growth have been logged since 1954.

Winter habitat has been suggested as the limiting factor for cavity-nesting birds including the brown creeper (Raphael and White, 1984; Haapanen, 1965). An interagency task group developed a winter habitat capability model for brown creepers in Southeast Alaska (Suring, et al., 1988). This habitat capability model identifies the following variables in describing the value of habitats for brown creepers:

Vegetation. The successional stage of the forest vegetation has a direct relationship to the quantity and quality of brown creeper winter habitats. Old-growth forests receive the highest brown creeper use. Higher volume classes have been found to receive higher use than lower volume classes.

Elevation. Forest stands above 1500 foot elevation are not considered valuable as brown creeper winter habitat.

Patch size, mobility and corridors. Brown creepers have been identified as a species which shows a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 15 acres, and use declines with decreasing

patch size and becomes zero when patches are less than one acre. Patch size includes the acres of all old-growth conifer stands equal to or greater than 20,000 board feet (20 MBF) to the acre. Specific vegetative corridor requirements have not been identified for the brown creeper. Brown creepers appear to be found in suitable habitats throughout the islands of Southeast Alaska, indicating an ability to disperse across water. Specific vegetative corridor requirements have not been identified for the hairy woodpecker.

Human disturbance and mortality factors. Reductions in habitat suitability and capability due to disturbance and mortality caused by humans have not been identified for the brown creeper.

Methodology and scientific accuracy. Only one study has been conducted in Southeast Alaska which collected data on brown creepers. This study forms the basis for the habitat capability model, although it may not represent average years or average conditions for Southeast Alaska. Winter habitat has been suggested as the most limiting factor for brown creepers, however, studies during other seasons of the year are needed to verify the assumption.

Vancouver Canada Goose

Vancouver Canada geese are distributed throughout the Alexander Archipelago of Southeast Alaska. The U.S. Fish and Wildlife Service estimates a resident population of 10,000 birds in the northern half of Southeast Alaska (Hodges and Conant, 1986). Breeding range for this bird extends from Yakutat south to Dixon Entrance and possibly into British Columbia (Hanson, 1962). This population is relatively non-migratory with only two percent of the birds that nest in Southeast Alaska migrating out of the area (Ratti and Timm, 1979). The majority of the birds move only locally between nesting, brood rearing, molting, and winter concentration areas.

Vancouver Canada geese use wetlands (both forested and non-forested) in the estuary, riparian, and upland areas of the forest.

Hanson (1962) indicated that nesting and brood rearing are probably the most limiting habitat factors. Nesting and brood rearing habitat are potentially affected by various Forest management activities. An interagency task group developed a habitat capability model for nesting and brood rearing habitat (Doyle, et al., 1988). The habitat capability model identifies the following variables in describing the nesting and brood rearing habitat values.

Vegetation. Estuaries, non-forested wetlands, and certain old-growth forest types are used by Vancouver Canada geese for nesting and brood rearing. Plant associations (Martin, 1989) are used to identify which old-growth forest types have the highest value.

Location/Elevation. Most nesting and brood rearing occur within 2,600 feet of uncontained river channels, lakes, and saltwater.

Patch size, mobility and corridors. Although Vancouver Canada geese probably respond to some minimum level of patch size, adequate information is not available to develop the patch size relationship. They are highly mobile and are found throughout the islands of Southeast Alaska. Vegetative corridor requirements have not been identified.

Human disturbance and mortality factors. Based on the solitary nature of Vancouver Canada geese and avoidance of disturbance (Hanson, 1962), proximity of roads and associated disturbance is included in the evaluation of habitat suitability and capability. Livezey (1978) observed an apparent relationship between number of geese seen and distance to roads. A weak, but significant, correlation was calculated from data presented in this report between number of geese observed per day on 19 lakes and distance classes from lake to road. Of eight

lakes where two or more geese were observed per day, all were greater than 660 feet from an active road.

Methodology and scientific accuracy. Several goose studies (primarily nesting and brood rearing studies) have been done in Southeast Alaska, and these studies form the basis for the habitat capability model. The U. S. Fish and Wildlife Service has conducted population surveys in portions of Southeast Alaska. Some limited hunter data is available. Knowledge of year-round goose habitat requirements is very limited. Additional research and information may indicate other limiting habitat factors (such as wintering habitats). Due to technical limitations with the GIS (i.e., placing 2,600 foot buffers around all salt water, uncontained river channels, and lakes has not been feasible), and lack of necessary resource information to identify plant associations forest-wide, the use and review of the habitat capability model has been limited.

Moose

Moose have not been designated a Management Indicator Species (MIS); however, at the request of the Alaska Department of Fish and Game, information on moose habitats and populations will be displayed as part of the Forest Plan Revision.

Moose migrated down the major river systems from Canada into Southeast Alaska during the early 20th century, and moose were first reported at Yakutat between 1930 to 1932. All moose in Southeast result from these natural migrations except those at Berner's Bay; they were transplanted there in the mid-1960's. Moose were also transplanted into the Chickamin River valley, but because suitable habitat was limited, this transplant did not result in an established herd. Moose may still be expanding their range in Southeast Alaska, with unconfirmed reports of moose being seen on Chichagof and Prince of Wales Islands. Given the short time they have been in Southeast, their distribution will probably increase. Currently, moose are present in the following Value Comparison Units (VCU's): 9, 12-17, 19, 20, 25, 41, 46, 55, 57, 65, 66, 68-77, 79-90, 95-123, 352-395, 428-434, 435, 436, 438, 441, 442, 445, 447-454, 463, 464, 468-471, 475-480, 482-487, 489-505, 508-524, 782, 786, 788, 790, 791, 793-796.

The Alaska Department of Fish and Game recently completed a "Strategic Plan for Management of Moose in Region 1, Southeast Alaska, 1990-94" (Alaska Department of Fish and Game, 1991). In the strategic plan, they estimate the current post-hunt moose population for Southeast Alaska to be 2,530 animals; about 75 percent of this moose population resides on the Tongass National Forest.

Moose habitat in Southeast Alaska is associated primarily with riparian and post-glacial early-successional vegetation types (ADF&G, 1991). In most areas, much of the moose habitat is declining as a result of natural plant succession. Succession in some areas is transforming deciduous vegetation types (dominated by cottonwood trees, willows, etc.) into conifer stands. In other areas, climax deciduous vegetation is growing to sizes less valuable as moose browse (ADF&G, 1991).

In some moose habitat areas, clearcut logging has returned conifer stands to early successional vegetation types which may temporarily create or enhance forage for moose. This forage enhancement exists for about 25 years out of a 100 year timber harvest rotation. As second-growth timber stands become established in the logged areas, forage production is severely diminished to levels below that of the original old-growth forest. The short-term advantages of clearcutting for moose may be offset by the longer period of reduced forage in the second growth conifer forest (ADF&G, 1991).

Old-Growth Forests

At the present time, timber harvesting on the Tongass primarily occurs in the old-growth forests. The harvesting of old-growth forests and the subsequent effects on wildlife habitats and populations is the dominant public issue related to wildlife on the Tongass. The Old-Growth Forest section in Chapter 3 of the DEIS describes the current status of Tongass forests.

Roaded and Roadless Areas

Associated with timber harvesting and some other resource management activities is the development of roads and other transportation facilities. This development often allows increased human access into areas, and this access can have a detrimental effect on wildlife populations and habitats.

Table 3-180 summarizes the amount of each ecological province which is currently in a roadless or roaded condition. See the Biological Diversity Section of this chapter for a description of each of the 21 Ecological Provinces. Province 14 (North Central Prince of Wales) has the highest percentage of area in a roaded condition, and the highest number of roaded acres. For the Forest as a whole, 8 percent is currently classified as roaded, and 92 percent is currently classified as roadless. Appendix L displays roaded conditions for each of ADF&G's 191 Wildlife Analysis Areas. See the Subsistence map in the map packet for locations and reference numbers for each of the Wildlife Analysis Areas.

There are 3,355 miles of existing Forest road as of October 1990. About 41 percent of these road miles are only accessible by boat or airplane (are not connected to any community nor tied into any ferry access point). About 35 percent of the miles are currently closed. Some roads have been closed to protect wildlife habitat values.

Table 3-180

Roaded and roadless acres, and miles of roads in each ecological province

Ecological Province	Roaded Acres	Roadless Acres	Percent Roaded	Miles of Roads
1 Yakutat Forelands	23,958	283,470	8	84
2 Yakutat Uplands	1,822	916,921	0	0
3 East Chichagof Island	141,612	915,972	13	335
4 West Chichagof Island	560	279,926	0	4
5 East Baranof Island	25,174	366,806	6	58
6 West Baranof Island	55,495	717,128	7	106
7 Admiralty Island	13,650	1,031,464	1	23
8 Lynn Canal	14,591	629,725	2	42
9 Northern Coast Range	5,295	1,007,211	1	37
10 Kupreanof/Mitkof	165,935	594,713	22	362
11 Kuiu Island	99,896	383,755	21	174
12 Central Coast Range	17,778	703,381	2	33
13 Etolin Island & Vicinity	144,853	355,266	29	264
14 North Central POW	450,576	809,977	36	1,292
15 Revilla/Cleveland	87,460	1,082,099	7	339
16 Southern Outer Islands	38,947	175,016	18	154
17 Dall Island & Vicinity	3,293	106,606	3	0
18 South POW Island	12,173	358,421	3	5
19 North Misty	14,466	956,946	1	28
20 South Misty	2,482	901,822	0	15
21 Ice Fields	14,510	2,944,085	0	0

Source: Revision Data base, Q200E, April 1991.

Consumptive Use of Wildlife

Many of the wildlife species on the Tongass are important for subsistence and recreational hunting. An overview of the consumptive use of wildlife resources is presented here.

Sitka Black-tailed Deer. Table 3-181 summarizes deer harvests, number of hunters and hunter-days within the Tongass National Forest. The annual deer harvest has increased in the 1980's, from 5,690 deer harvested in 1980 to a high of 18,546 in 1987; representing a 226 percent increase over an eight-year period. Deer harvests for 1988 and 1989 declined from the high of 1987.

Deer harvests have not been evenly distributed throughout Southeast Alaska. Of the total deer harvested between 1980-89, 73 percent were harvested in Game Management Unit 4, which includes Admiralty, Baranof, Chichagof and adjacent islands. Another 18 percent of the deer harvest occurred in Game Management Unit 2, which includes Prince of Wales Island and adjacent islands. Only one percent of the deer harvest has occurred in Game Management Unit 3, which includes Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, Wrangell, and adjacent islands (most of Game Management Unit 3 has been closed to deer hunting during the 1980's). About eight percent of the deer harvest has occurred on the mainland in Game Management Units 1A, 1B, and 1C.

Between 1980 and 1986, the number of deer hunters increased from 7,335 to 14,189; a 93 percent increase. The number of deer hunters has declined since the high of 1986, to 12,369 hunters in 1989.

The number of hunter-days follows the same trend as the number of hunters. Between 1980 and 1986 the number of hunter-days increased from 31,380 to 67,243, a 114 percent increase. The number of hunter-days has declined since the high of 1986, to 45,296 hunter-days in 1989.

The number of deer hunters and hunter-days have not been evenly distributed throughout Southeast Alaska. Between 1980 and 1989, a total of 55 percent of the deer hunters and hunter-days occurred in Game Management Unit 4, which includes Admiralty, Baranof, Chichagof and adjacent islands. Another 19 percent of the deer hunters and 23 percent of the hunter-days occurred in Game Management Unit 2, which includes Prince of Wales and adjacent islands. Twenty-two percent of the hunters and 18 percent of the hunter-days occurred in Game Management Units 1A, 1B, and 1C. Three percent of the hunters and two percent of the hunter-days occurred in Game Management Unit 3, which includes Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, Wrangell and adjacent islands.

Appendix L contains deer harvest information by ADF&G deer management areas and Wildlife Analysis Areas (WAA). Table 3-182 provides a listing of the WAA's which have had the highest deer harvests during the 1987-89 period in each Game Management Unit (GMU). ADF&G did not collect deer harvest data by WAA prior to 1987. The WAA's listed in Table 3-182 account for 46 percent of all deer harvested on the Tongass during the 1987-89 period.

In GMU 1A, the WAA's with the highest deer harvests are those which are adjacent to or within short distances of Ketchikan. These WAA's have had varying amounts of roading and timber harvesting.

In GMU 1B, the WAA's with the highest deer harvests are those which are within short distances of Petersburg or Ketchikan.

In GMU 1C, WAA's immediately adjacent to Juneau receive the highest deer hunting activity.

In GMU 2, the WAA's immediately adjacent to the communities of Craig and Klawock receive the highest deer harvests. Ferry access and road access to Prince of Wales Island results in some WAA's receiving high use by Ketchikan hunters. Petersburg hunters have made use of northern Prince of Wales Island; islands closer to Petersburg (Mitkof, Kupreanof, Kuiu) have been closed to deer hunting through the 1980's and this may account for the high use of this area by Petersburg hunters.

In GMU 3, the small islands north and west of the town of Wrangell have had the highest deer hunting activity.

In GMU 4, the WAA's adjacent to or within relatively short distances of Sitka receive some of the highest deer harvests of all WAA's in Southeast Alaska. Northern Admiralty Island receives high hunting activity from Juneau hunters. WAA 4252 is directly west of Hoonah. Petersburg hunters have made use of southern Admiralty Island.

Adjacency to communities or ferry and road access appear to be dominant factors influencing the distribution of deer hunting activity.

Table 3-181

Annual Sitka black-tailed deer harvest (number of deer killed), number of hunters, and hunter-days within the Tongass National Forest for years 1980-1989

	Year [1]								
Unit [2]	**1980**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**
Annual Deer Harvest (# of animals killed)									
1A	395	340	440	530	629	801	549	671	559
1B	25	5	20	5	38	70	60	101	73
1C	245	290	400	399	527	433	485	429	489
2	615	1,185	1,740	1,880	3,150	2,805	3,808	2,849	2,806
3	100	75	80	130	173	201	79	223	235
4	4,310	5,630	8,360	8,900	10,390	10,254	13,565	11,929	10,758
Unknown	-	25	10	-	111	138	-	-	-
Total	**5,690**	**7,550**	**11,050**	**11,844**	**15,018**	**14,702**	**18,546**	**16,202**	**14,920**
Number of Hunters									
1A	1,285	1,180	1,300	1,455	1,624	1,415	1,248	1,319	1,310
1B	120	65	80	70	100	119	155	188	220
1C	935	1,275	955	1,075	1,315	1,129	1,140	1,009	1,056
2	735	1,296	1,725	2,180	2,658	2,929	3,278	2,760	2,979
3	240	295	285	440	471	412	379	328	348
4	4,020	5,660	6,660	6,580	6,095	7,593	7,613	7,048	6,456
Unknown	0	70	110	300	0	592	-	-	-
Total	**7,335**	**9,841**	**11,115**	**12,100**	**12,263**	**14,189**	**13,813**	**12,652**	**12,369**
Number of Hunter-days [3]									
1A	5,160	4,370	5,130	5,520	5,295	6,726	5,864	4,896	4,251
1B	490	260	200	430	359	561	689	590	1,097
1C	2,770	3,980	3,110	3,610	3,978	3,835	3,666	2,930	2,898
2	4,600	9,190	11,290	13,070	14,181	17,505	17,703	10,668	12,292
3	840	1,140	1,210	1,440	1,138	1,197	817	1,371	1,338
4	17,520	26,560	31,030	28,710	25,184	33,415	38,244	28,901	23,420
Unknown	0	240	580	1,750	124	4,004	-	-	-
Total	**31,380**	**45,740**	**52,550**	**54,530**	**50,259**	**67,243**	**66,983**	**49,356**	**45,296**

Source: ADF&G, letters dated June 21, 1988 and September 2, 1988. 1988 and 1989 ADF&G Deer Harvest computer printouts.

[1] Deer harvest data was not collected by the Alaska Department of Fish and Game in 1981. Years without any data (designated by a -) reflect no recorded information.

[2] Unit = Game Management Unit (Alaska Department of Fish and Game)

[3] Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for eight hours is the equivalent of one hunter day.

Table 3-182

Characteristics of the Wildlife Analysis Areas (WAA) which have had the highest Deer harvests in each Game Management Unit (GMU) between 1987-89

WAA #	# of Deer Harvested 1987-89	*National Forest Lands* Total Acres	Percent Roaded	1954 O.G. Acres[1]	Percent O.G. Cut	*State and Private Lands* Total Acres	Original O.G. Acres[2]	Percent O.G. Cut	Majority of Deer Hunters from These Communities
GMU 1A									
101	299	38,952	3	18,851	4	22,690	21,974	38	Ketchikan
613	284	45,412	3	23,935	3	820	779	100	Ketchikan
407	223	44,973	8	19,531	1	24,144	20,764	95	Ketchikan
406	205	127,785	11	61,213	8	2,798	2,406	100	Ketchikan
612	203	70,653	1	33,564	1	180	171	100	Ketchikan
GMU 1B									
1605	102	149,092	10	26,831	17	3,517	1,301	0	Petersburg
1817	66	64,120	0	35,007	0	319	303	100	Ketchikan
GMU 1C									
2722	988	29,889	4	16,834	0	19,108	16,623	30	Juneau
2621	211	3,750	0	2,809	0	1,604	1,556	0	Juneau
2517	138	76,336	0	9,246	0	25,415	6,100	100	Juneau
GMU 2									
1318	1,213	62,704	15	25,278	5	64,403	52,810	100	Craig, Klawock
1422	1,129	122,729	57	81,905	34	3,373	3,137	0	Ketchikan, Craig, Klawock
1421	1,052	91,470	44	59,671	22	1,219	1,121	0	Ketchikan, Craig
1319	693	104,462	30	60,511	18	0	0	0	Thorne Bay, Craig, Ketchikan
1529	570	69,446	58	50,476	26	1,720	1,634	41	Petersburg, Labouchere Bay
1420	544	44,358	53	29,108	40	2,659	2,499	2	Ketchikan, Coffman Cove
1527	458	42,511	45	26,884	21	2,148	2,019	100	Petersburg, Klawock
1315	431	72,754	58	44,717	31	24,705	19,517	62	Ketchikan
1530	399	62,663	55	37,787	35	2,125	2,019	2	Ketchikan
GMU 3									
1904	291	23,113	47	14,782	22	0	0	0	Wrangell
GMU 4									
3001	2,682	81,381	19	34,158	15	0	0	0	Sitka
3002	1,645	80,463	11	16,182	22	13,641	5,184	90	Sitka
3003	1,444	60,222	9	24,514	4	5,429	3,583	0	Sitka
3104	1,231	55,471	30	28,531	20	0	0	0	Sitka
3836	1,171	53,689	3	31,974	0	501	426	0	Juneau
3939	1,141	66,131	0	39,363	0	20	17	0	Petersburg
4252	1,125	20,606	1	8,972	0	29,519	20,958	100	Hoonah
3311	1,115	56,224	2	19,292	2	20	15	0	Sitka
3310	1,005	57,809	11	21,753	6	0	0	0	Sitka
3835	924	33,033	0	13,548	0	900	819	0	Juneau

Source: Revision data base, Q1021, May 1991; Q200E91A, April 1991; ADF&G deer harvest data for 1987-1989; State and Private lands data compiled by USDA State and Private Forestry.

[1] 1954 old growth acres is the total acres of productive old growth (Strata A, B, C, D).

[2] Original old growth acres is the total acres of productive forest land at the time the land was conveyed to the State or private entity.

Mountain Goat. Table 3-183 summarizes the annual mountain goat harvest, number of hunters, and number of hunter-days occurring within the Tongass National Forest. The annual mountain goat harvest has ranged from a high of 239 in 1981 and 1982 to a low of 140 in 1987. The annual number of hunters has ranged from 463 to 677, and the number of hunter-days from 1,335 to 1,848.

Table 3-183

Annual Mountain Goat harvest, number of hunters, and hunter-days by sport and subsistence hunters within the Tongass National Forest

					Year					
Unit[1]	1980	1981	1982	1983	1984	1985	1986	1987	1988[2]	1989[2]
Annual Mountain Goat Harvest (# of animals killed)										
1A	59	69	77	66	53	51	51	28		
1B	-[3]	35	22	27	40	32	41	38		
1C	28	31	43	42	29	35	42	31		
1D[4]	3	9	10	9	5	1	7	5		
4	49	75	74	60	49	41	50	36		
5	5	20	13	17	4	7	5	2		
Total	**144**	**239**	**239**	**221**	**180**	**167**	**196**	**140**		
Number of Hunters										
1A	128	146	154	147	141	137	122	88		
1B	-	85	82	93	71	110	127	83		
1C	86	90	117	101	82	83	83	98		
1D[4]	77	83	41	37	90	73	59	39		
4	156	225	245	218	156	147	142	137		
5A	25	47	38	33	25	23	11	18		
Total	**472**	**676**	**677**	**629**	**565**	**573**	**544**	**463**		
Number of Hunter-days[5]										
1A	348	453	445	469	475	445	374	311		
1B	-	234	153	218	173	283	302	231		
1C	237	210	299	326	218	194	225	226		
1D[4]	304	229	76	73	210	157	117	111		
4	401	562	677	498	378	391	309	358		
5	137	160	140	97	78	72	40	98		
Total	**1,427**	**1,848**	**1,790**	**1,681**	**1,532**	**1,542**	**1,367**	**1,335**		

Source: Planning Record, letter dated August 18, 1988.

[1] Unit = Game Management Unit (Alaska Department of Fish and Game.

[2] Data for 1988 and 1989 were not available at time of printing.

[3] Years without any data (designated by a -) reflect no recorded information.

[4] Some of the mountain goat harvest in Unit 1D may be from non-National Forest lands.

[5] Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for 8 hours is equivalent to one hunter day.

Table 3-184 summarizes the distribution of the harvest, hunters, and hunter days between the Game Management Units. Unit 1A had the highest percentage of harvest, while Unit 4 had the highest percentage of hunters and hunter-days.

Table 3-184

Distribution of mountain goat harvest, hunters, and hunter-days for the period 1980-1987

Unit[1]	% Harvest	% Hunters	% Hunter-days
1A	30	23	27
1B	15	14	13
1C	18	16	15
1D	3	11	10
4	28	31	28
5A	5	5	7

Source: Alaska Department of Fish and Game Harvest data, 1980-87.

[1] Unit = Game Management Unit (Alaska Department of Fish and Game).

Appendix L contains mountain goat harvest information by ADF&G Wildlife Analysis Areas (WAA). Table 3-185 provides a listing of the WAA's which have had the highest mountain goat harvests during the 1980-87 period in each Game Management Unit (GMU). The WAA's listed in Table 3-185 account for 69 percent of all mountain goats harvested on the Tongass during the 1980-87 period. Mountain goat hunting in Southeast Alaska is regulated by ADF&G "registration permits." Therefore, proximity to towns and road access do not necessarily affect the amount of hunting in a particular WAA.

Table 3-185

Characteristics of the Wildlife Analysis Areas (WAA) which have had the highest Mountain Goat harvests in each Game Management Unit (GMU) during the 1980-87 period

		National Forest Lands				State and Private Lands			
WAA #	# of Goats Harvested 1980-87	Total Acres	Percent Roaded	1954 O.G. .Acres[1]	Percent O.G. Cut	Total Acres	Original O.G.Acres[2]	Percent O.G. Cut	Nearby Town or Ferry Access
GMU 1A									
719	146	200,236	0	44,577	0	0	0	0	-
717	97	145,861	0	30,999	0	80	50	0	-
715	81	101,564	0	42,097	0	0	0	0	-
GMU 1B									
1708	51	240,796	0	36,056	0	140	38	0	Wrangell
1706	42	99,140	0	12,289	0	0	0	0	Petersburg
1603	31	78,659	2	16,462	3	0	0	0	Petersburg
GMU 1C									
2824	115	295,473	0	9,764	0	0	0	0	-
2825	52	305,641	0	32,168	0	100	19	0	-
GMU 1D									
4407	31	80,103	0	6,561	0	0	0	0	Skagway
GMU 4									
3001[3]	234	203,671	15	64,781	15	13,641	5,184	90	Sitka
3003	130	60,222	9	24,514	4	5,429	3,583	0	Sitka
GMU 5A									
4503[3]	47	752,062	4	60,127	6	27,551	16,200	100	Yakutat

Source: Revision data base, Q1021, May 1991; Q200E91A, April 1991; ADF&G mountain goat harvest data for 1980-87; State and Private lands data compiled by USDA State and Private Forestry.

[1] 1954 old growth acres are the total acres of productive old growth (Strata A, B, C, D).

[2] Original old growth acres are the total acres of productive forest land at the time the land was conveyed to the State or private entity.

[3] Some WAA's had boundary changes or were divided into more than one WAA. To be consistent in compiling mountain goat data through the 1980's, the data for these WAA's includes the following: data for WAA 3001 also includes WAA's 3002 and 3314; data for WAA 4503 also includes WAA 4508.

Brown Bear. Table 3-186 summarizes the annual harvest of brown bears and the number of hunter-days for successful hunters within the Tongass National Forest. The annual brown bear harvest has ranged from a low of 88 in 1980 to a high of 151 in 1987. A total of 1,166 brown bears were harvested between 1980 and 1989. Between 1980 and 1989, 74 percent of the harvest came from Game Management Unit 4, 16 percent from Unit 5A, and three percent from each of Units 1A, 1B, and 1C.

Within Game Management Unit 4, the 1980 through 1989 brown bear harvest was distributed as follows: 39 percent occurred on Chichagof or adjacent islands, 39 percent on Admiralty or adjacent islands, and 21 percent on Baranof or adjacent islands.

Alaska Department of Fish and Game only collects data on the number of "successful" brown bear hunters. The number of successful brown bear hunters is the same as the number of brown bear harvested. The number of brown bear hunter-days is the number of hunter-days for

successful hunters. No data is available for unsuccessful hunters. Between 1980 and 1989, the annual number of successful brown bear hunter-days has ranged from 388 in 1981 to 625 in 1987. From 1980 through 1989, 74 percent of the hunter-days occurred in Game Management Unit 4, 19 percent in Unit 5A, three percent in Unit 1B, and two percent in each of Units 1A and 1C.

Appendix L contains brown bear harvest information by ADF&G Wildlife Analysis Areas (WAA). Table 3-187 provides a listing of the WAA's which have had the highest brown bear harvests during the 1980-89 period in each Game Management Unit (GMU). The WAA's listed in Table 3-187 account for 39 percent of all brown bears harvested on the Tongass during the 1980-89 period. The amount of roading and logging on National Forest lands in these WAA's ranges from 0 to 14 percent. Logging on state and private lands has been extensive in three of the WAA's. Several of the WAA's are within designated Wilderness areas or LUD II areas. Road access and proximity to towns does not appear to account for high brown bear hunting activity in all areas. Current Alaska brown bear hunting regulations require non-resident hunters to be accompanied by a guide; use of guides may account for the distribution of some brown bear hunters into more remote areas.

Table 3-186

Annual Brown Bear harvest (# of animals killed) and hunter-days by sport and subsistence hunters within the Tongass National Forest

	Calendar Year									
Unit[1]	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**
Annual Brown Bear Harvest (number of animals killed) [2]										
1A	1	1	2	7	3	1	2	5	4	7
1B	3	5	3	2	4	5	5	4	3	1
1C	3	1	6	4	5	6	6	3	2	4
1D	0	1	0	0	1	0	0	0	1	0
3	0	0	0	2	0	0	0	0	0	0
4	65	60	51	80	109	87	95	112	119	90
5A	16	16	20	24	17	15	15	27	18	17
Total	**88**	**84**	**82**	**119**	**139**	**114**	**123**	**151**	**147**	**119**
Number of Hunter-days [3]										
1A	1	7	8	29	10	6	13	12	6	26
1B	12	9	6	9	17	39	27	7	19	2
1C	4	2	22	11	11	15	12	7	3	8
1D	0	2	0	0	10	0	0	0	2	0
3	0	0	0	6	0	0	0	0	0	0
4	337	289	260	360	479	375	419	458	500	430
5	98	82	107	159	95	92	98	141	59	63
Total	**452**	**391**	**403**	**574**	**622**	**527**	**569**	**625**	**589**	**529**

Source: Planning Record, letter dated June 21, 1988; ADF&G information dated April 4, 1991.

[1] Unit = Game Management Unit (Alaska Department of Fish and Game)

[2] Brown bear kills not attributed to legal sport and subsistence hunting are not included in this table.

[3] Hunter-days are compiled by the Alaska Department of Fish and Game: one hunter-day is equivalent to one person hunting for any length of time during a 24-hour period. Brown bear hunter day information is only collected for successful hunters; the number of hunter-days for unsuccessful hunters is unknown.

Table 3-187

Characteristics of the Wildlife Analysis Areas (WAA) which have had the highest Brown Bear harvests in each Game Management Unit (GMU) during the 1980-89 period

		National Forest Lands				*State and Private Lands*			
WAA #	# of Bears Harvested 1980-87	Total Acres	Percent Roaded	1954 O.G. Acres[1]	Percent O.G. Cut	Total Acres	Original O.G.Acres[2]	Percent O.G. Cut	Nearby Town or Ferry Access
GMU 1A									
716	13	335,123	0	77,715	1	500	270	0	-
GMU 1B									
1813	10	236,589	9	38,746	14	921	350	0	-
GMU 1C									
2823	13	410,930	0	68,715	0	656	224	0	-
GMU 1D									
4408	2	240,418	0	14,993	0	0	0	0	Haines
GMU 4									
4041[3]	72	122,880	4	74,883	0	879	760	78	-
3939	55	66,131	0	39,363	0	20	17	0	-
3938	49	76,664	0	49,541	0	20	18	0	-
3940	45	67,845	5	35,782	0	40	35	0	-
3523[3]	44	117,030	14	49,927	6	36,343	25,727	100	Hoonah & ferry
GMU 5A									
4503[3]	144	752,062	4	60,127	6	27,551	16,200	100	Yakutat

Source: Revision data base, Q1021, May 1991; Q200E91A, April 1991; State and Private lands data compiled by USDA State and Private Forestry; Planning Record, letter dated June 21, 1988; ADF&G information dated April 4, 1991.

[1] 1954 old growth acres is the total acres of productive old growth (Strata A, B, C, D).

[2] Original old growth acres is the total acres of productive forest land at the time the land was conveyed to the State or private entity.

[3] Some WAA's had boundary changes or were divided into more than one WAA in 1988 or 1989. To be consistent in compiling brown bear data through the 1980's, the data for these WAA's includes the following: data for WAA 4041 also includes WAA 4055; data for WAA 3523 also includes WAA's 4252 and 4253; data for WAA 4503 also includes WAA 4508.

Black Bear. Table 3-188 summarizes the annual harvest of black bears, and the number of hunter-days for successful hunters within the Tongass National Forest. A total of 4,041 black bears were harvested between 1980 and 1989. The annual black bear harvest has ranged from a low of 224 in 1981 to a high of 587 in 1989. For the period 1980 through 1989, 32 percent of the harvest came from Game Management Unit 2, 29 percent from Unit 3, 18 percent from Unit 1C, 12 percent from 1A, five percent from Unit 5A, four percent from Unit 1B.

The Alaska Department of Fish and Game only collects data on the number of "successful" black bear hunters. The number of successful black bear hunters is the same as the number of black bear harvested. The number of black bear hunter-days is the number of hunter-days for successful hunters. No data is available for unsuccessful hunters. For the period 1980 through 1989, the annual number of successful black bear hunter-days has ranged from 772 in 1980 to 2,054 in 1989. Between 1980 and 1989, 31 percent of the hunter-days occurred in Game Management Unit 3, 30 percent in Unit 2, 16 percent in Unit 1C, 10 percent in Unit 5A, 10 percent in Unit 1A, and three percent in Unit 1B.

Appendix L contains black bear harvest information by ADF&G Wildlife Analysis Areas (WAA). Table 3-189 provides a listing of the WAA's which have had the highest black bear harvests during the 1980-89 period in each Game Management Unit (GMU). The WAA's listed in Table 3-189 account for 46 percent of all black bears harvested on the Tongass during the 1980-89 period. These WAA's encompass National Forest lands which range from 0 to 64 percent roaded, and from 0 to 35 percent of the old growth being logged. For state and private lands, the amount of old growth which has been logged ranges from 0 to 100 percent. Road and ferry access appear to contribute to high black bear hunting activity and harvests in many of the WAA's. However, several of the WAA's are remote and still receive high black bear harvests.

Table 3-188

Annual Black Bear harvest (# of animals killed) and hunter-days by sport and subsistence hunters within the Tongass National Forest

	Calendar Year									
Unit[1]	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**
Annual Harvest (number of animals killed) [2]										
1A	27	26	38	47	45	51	65	61	56	52
1B	10	1	9	12	17	22	19	21	8	24
1C	41	39	72	50	81	98	73	106	87	101
1D	1	4	0	0	1	0	3	1	0	0
2	86	75	114	88	123	108	157	152	205	179
3	41	65	84	82	90	122	137	153	173	205
5A	22	14	27	18	19	34	23	16	17	11
Total	**228**	**224**	**344**	**297**	**376**	**435**	**477**	**510**	**563**	**587**
Annual Number of Hunter-Days [3]										
1A	103	72	96	159	121	169	152	158	157	152
1B	18	2	21	17	34	37	52	51	40	91
1C	121	147	180	116	231	242	211	354	232	309
1D	1	8	0	0	0	0	3	1	0	0
2	264	247	251	273	302	308	529	447	654	636
3	127	201	283	250	310	469	466	542	538	797
5A	138	95	160	86	127	202	169	102	105	60
Total	**772**	**782**	**991**	**901**	**1,126**	**1,427**	**1,582**	**1,655**	**1,734**	**2,054**

Source: Planning Record, June 21, 1988; ADF&G data dated April 9, 1991.

[1] Unit = Game Management Unit (Alaska Department of Fish and Game).

[2] Black bear kills not attributed to legal sport and subsistence hunting are not included in this table.

[3] Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter-day is equal to one person hunting for any length of time during a 24-hour period. Black bear hunter day information is only collected for successful hunters; the number of hunter-days for unsuccessful hunters is unknown.

Table 3-189

Characteristics of the Wildlife Analysis Areas (WAA) which have had the highest Black Bear harvests in each Game Management Unit (GMU) during the 1980-89 period

WAA #	# of Bears Harvested 1980-87	*National Forest Lands* Total Acres	Percent Roaded	1954 O.G. Acres[1]	Percent O.G. Cut	*State and Private Lands* Total Acres	Original O.G.Acres[2]	Percent O.G. Cut	Nearby Town or Ferry Access
GMU 1A									
406	105	127,785	11	61,213	8	2,798	2,406	100	Ketchikan
510	73	154,251	28	90,280	15	360	328	0	-
GMU 1B									
1603	40	78,659	2	16,462	3	0	0	0	Petersburg
GMU 1C									
2304	92	56,828	2	14,406	4	4,117	2,347	0	-
2823	88	410,930	0	68,715	0	656	224	0	-
GMU 2									
1318[3]	180	170,108	12	68,486	10	82,959	69,826	98	Craig, Klawock, ferry
1422[3]	155	158,796	64	111,082	35	4,036	3,773	0	Coffman Cove, Thorne Bay, ferry
1527[3]	152	105,174	51	64,671	29	4,273	4,038	51	Coffman Cove, N. Whale Pass, ferry
1317	109	61,625	33	32,691	33	8,752	7,964	61	Hollis, ferry
1214	105	75,954	16	36,976	11	21,702	19,749	100	Hollis, ferry
GMU 3									
5014[3]	287	282,753	4	173,539	1	180	171	0	-
5012	181	143,972	54	108,728	16	4,509	4,284	90	Kake
2007	181	115,283	58	67,469	17	19,484	18,315	73	Petersburg, ferry
GMU 5A									
4503[3]	119	752,062	4	60,127	6	27,551	16,200	100	Yakutat

Source: Revision data base, Q1021, May 1991; Q200E91A, April 1991; State and Private lands data compiled by USDA State and Private Forestry; Planning Record, letter dated June 21, 1988; ADF&G information dated April 9, 1991.

[1] 1954 old growth acres is the total acres of productive old growth (Strata A, B, C, D).

[2] Original old growth acres is the total acres of productive forest land at the time the land was conveyed to the state or private entity.

[3] Some WAA's had boundary changes or were divided into more than one WAA in 1988 or 1989. To be consistent in compiling black bear data through the 1980's, the data for these WAA's includes the following: data for WAA 1318 also includes WAA's 1332 and 1323; data for WAA 1422 also includes WAA 1531; data for WAA 1527 also includes WAA 1530; data for WAA 5014 also includes WAA's 5016, 5017, and 5018 (prior to 1988, all of these WAA's were combined into WAA 2014); data for WAA 4503 also includes WAA 4508.

Moose. The Alaska Department of Fish and Game developed a "Strategic Plan for Management of Moose in Southeast Alaska, 1990-94" (ADF&G, 1991). The harvest data in Table 3-190 is taken from this strategic plan.

The annual moose harvest has ranged from 204 animals in 1984 to 160 animals in 1986. The annual number of hunters has ranged from 1,146 in 1984 to 793 in 1985. The number of hunter-days has ranged from 3,981 in 1986 to 5,782 in 1984. This data includes some harvest and hunting from non-National Forest lands, primarily in the Chilkat Valley area.

Table 3-191 lists moose management areas identified by ADF&G along with data on the amount of roading and logging which has occurred in each area. The amount of roading and logging on National Forest Lands ranges from 0 to 5 percent for roading and 0 to 6 percent for

logging. Logging on state and private lands has been extensive in three of the areas. Moose populations and distributions are limited in Southeast Alaska. Demand for moose hunting exceeds the supply of moose; moose hunting in Southeast Alaska is regulated by ADF&G "registration permits" or "drawing permits." Therefore, the amount of hunting activity is dependent on moose numbers and distribution and not necessarily access or proximity to towns.

Table 3-190

Moose harvest data for the years 1984 through 1989[1]

Year	Number of Hunters	Number of Hunter-days	Annual Hunter Kill
1984	1,146	5,782	204
1985	793	4,397	172
1986	868	3,981	160
1987	964	4,172	164
1988	1,008	4,165	202
1989	1,041	4,149	177

Source: Strategic Plan for Management of Moose in Region I, Southeast Alaska, 1990-94 (ADF&G 1991)

[1] This data includes non-National Forest lands, primarily in Game Management Unit 1D, in the Chilkat Valley area.

Table 3-191

Characteristics of Moose planning areas on the Tongass National Forest[1]

		National Forest Lands		*State and Private Lands*	
Area[2]	# of Moose Harvested 1981-89	Percent Roaded	Percent O.G. Cut[4]	Percent O.G. Cut[4]	Nearby Town or Ferry Access
Unuk	26	0	0	0	-
Stikine	394	0	0	0	Wrangell, Petersburg
Thomas	123	5	5	0	Petersburg
Taku	165	0	0	100	Juneau
Berner's	73	0	0	100	Juneau
Chilkat[3]	50	1	5	0	-
Yakutat	402	4	6	100	Yakutat
Nunatak[3]	23	0	0	0	Yakutat

Source: Revision data base, Q1021, May 1991; Q200E91A, April 1991; State and Private lands data compiled by USDA State and Private Forestry; ADF&G 1991.

[1] Information in this table is based on estimates from comparing ADF&G moose distribution maps (ADF&G 1991) with roaded and harvest data compiled by each WAA.

[2] A more complete description of each area is as follows: Unuk includes the Unuk River and Chickamin River; Stikine includes the Stikine River (WAA's 1707 and 1708) plus WAA's 1810, 1811, 1812; Thomas includes Thomas Bay and Farragut Bay areas; Taku includes WAA 2518 plus WAA's 2926 and 2927; Berner's includes the general Berner's Bay area; Chilkat means the Chilkat Range including WAA's 2202, 2203, 2204; Yakutat includes the Yakutat Forelands; Nunatak includes the Nunatak Bench.

[3] Chilkat moose harvest data is for the years 1984-89; Nunatak harvest data is for the years 1981-85 (the hunting season has been closed since 1986).

[4] Percent old growth harvested refers to the percent of the 1954 productive old growth that has been harvested on National Forest lands. For State and private lands, percent of old growth harvested refers to the percent of the productive old growth harvested since conveyance of the lands to the State or private entity.

Wolf. Table 3-192 summarizes the wolf harvest within the Tongass National Forest. The annual wolf harvest has ranged from a low of 63 for the 1979-80 trapping season to a high of 105 in the 1986-87 season. A total of 648 wolves were harvested from 1979-80 through the 1986-87 seasons. During this period, 33 percent of the harvest came from Game Management Unit 2, 25 percent from Unit 1A, 16 percent from Unit 3, 10 percent from Unit 1C, 8 percent from Unit 1B, 7 percent from Unit 5A, and 5 percent from Unit 1D.

Data is not collected for total number of trappers or number of trapper-days for wolf or any of the other furbearing (trapped) species.

Appendix L contains wolf harvest information by ADF&G Wildlife Analysis Areas (WAA). Table 3-193 provides a listing of the WAA's which have had the highest wolf harvests during the 1980-87 period in each Game Management Unit (GMU). The WAA's listed in Table 3-193 account for 43 percent of all wolves harvested on the Tongass during the 1980-87 period. These WAA's encompass National Forest lands which range from 0 to 64 percent roaded, and from 0 to 40 percent of the old growth being logged. For state and private lands, the amount of old growth which has been logged ranges from 0 to 100 percent. Proximity to communities and road access appear to influence the amount of wolf harvesting. At the present time, state wolf hunting regulations for Southeast Alaska allow for year-around hunting with no limits on the number of wolves which can be harvested.

Table 3-192

Annual harvest of Wolves within the Tongass National Forest [1]

	Year								
Unit[2]	**79-80**	**80-81**	**81-82**	**82-83**	**83-84**	**84-85**	**85-86**	**86-87**	**87-88**
1A	21	17	20	20	37	15	11	21	
1B	4	3	5	8	4	10	9	12	
1C	5	9	4	8	8	9	15	7	
1D	1	- [3]	-	-	-	-	-	4	
2	10	37	20	17	27	42	19	39	
3	16	12	14	17	13	11	10	10	
5A	6	1	3	4	4	13	4	12	
Total	**63**	**79**	**66**	**74**	**93**	**100**	**68**	**105**	

Source: Planning Record dated April 8, 1988.

[1] 1987-88 harvest data for wolf was not available.

[2] Unit = Game Management Unit (Alaska Department of Fish and Game).

[3] Years designated without any data (designated by a -) reflect no recorded information.

Table 3-193

Characteristics of the Wildlife Analysis Areas (WAA) which have had the highest Wolf harvests in each Game Management Unit (GMU) during the 1980-87 period

		National Forest Lands				*State and Private Lands*			
WAA #	# of Wolves Harvested 1980-87	Total Acres	Percent Roaded	1954 O.G. Acres[1]	Percent O.G. Cut	Total Acres	Original O.G.Acres[2]	Percent O.G. Cut	Nearby Town or Ferry Access
GMU 1A									
407	39	44,973	8	19,531	1	24,144	20,764	95	Ketchikan, ferry
405	31	53,095	11	26,716	6	180	171	100	Ketchikan
GMU 1B									
1605	22	149,092	10	26,831	17	3,517	1,301	0	Petersburg
1817	11	64,120	0	35,007	0	319	303	100	Meyers Chuck
GMU 1C									
2409	14	17,279	0	7,829	0	961	663	100	Juneau
GMU 2									
1318[3]	22	170,108	12	68,486	10	82,959	69,826	98	Craig, Klawock, ferry
1420	20	44,358	53	29,108	40	2,659	2,499	2	Coffman Cove
1422[3]	19	158,796	64	111,082	35	4,036	3,773	0	Thorne Bay, Coff-man Cove, ferry
1315	18	72,754	58	44,717	31	24,705	19,517	62	Thorne Bay, Kasaan, ferry
1527[3]	16	105,174	51	64,671	29	4,273	4,038	51	Coffman Cove, N.Whale Pass, ferry
GMU 3									
2007	26	115,283	58	67,469	17	19,484	18,315	73	Petersburg, ferry
GMU 5A									
4503[3]	43	752,062	4	60,127	6	27,551	16,200	100	Yakutat

Source: Revision data base, Q1021, May 1991; Q200E91A, April 1991; State and private lands data compiled by USDA State and Private Forestry; Planning Record dated April 8, 1988.

[1] 1954 old growth acres is the total acres of productive old growth (Strata A, B, C, D).

[2] Original old growth acres is the total acres of productive forest land at the time the land was conveyed to the State or private entity.

[3] Some WAA's had boundary changes or were divided into more than one WAA. To be consistent in compiling wolf data through the 1980's, the data for these WAA's includes the following: data for WAA 1318 also includes WAA's 1332 and 1323; data for WAA 1422 also includes WAA 1531; data for WAA 1527 also includes WAA 1530; data for WAA 4503 also includes WAA 4508.

Marten. Table 3-194 summarizes the marten harvest within the Tongass National Forest. ADF&G did not collect marten harvest data prior to 1984. The annual marten harvest has ranged from a low of 1,928 for the 1986-87 trapping season to a high of 3,468 for the 1987-88 season. A total of 11,088 marten were harvested from 1984-85 through the 1987-88 seasons. During this period, 40 percent of the harvest came from Game Management Unit 4, 28 percent from Unit 2, nine percent from Unit 1C, eight percent from Unit 3, seven percent from Unit 1A, six percent from Unit 1B, and two percent from Unit 5A.

For Game Management Unit 4, the harvest was distributed as follows: 65 percent of the harvest was from Chichagof and adjacent islands, 23 percent from Baranof and adjacent islands, and 12 percent from Admiralty and adjacent islands.

Data is not collected for total number of trappers or number of trapper-days for any of the furbearing (trapped) species.

Appendix L contains marten harvest information by ADF&G Wildlife Analysis Areas (WAA). Table 3-195 lists the WAA's which have had the highest marten harvests during the 1984-87 period in each Game Management Unit (GMU). The WAA's listed in Table 3-195 account for 40 percent of all marten harvested on the Tongass during the 1984-87 period.

Table 3-194

Annual harvest of Marten within the Tongass National Forest[1]

	Year								
Unit[2]	**79-80**	**80-81**	**81-82**	**82-83**	**83-84**	**84-85**	**85-86**	**86-87**	**87-88**
1A	-[3]	-	-	-	-	203	138	127	298
1B	-	-	-	-	-	183	83	149	270
1C	-	-	-	-	-	245	151	241	350
1D	-	-	-	-	-	9	-	-	-
2	-	-	-	-	-	1,039	589	301	1,134
3	-	-	-	-	-	272	155	110	357
4	-	-	-	-	-	1,355	1,207	962	963
5A	-	-	-	-	-	63	-	38	96
Total	-	-	-	-	-	**3,369**	**2,323**	**1,928**	**3,468**

Source: Planning Record dated April 8, 1988.

[1] Harvest data for marten has only been collected since the 1984-85 trapping season.

[2] Unit = Game Management Unit (Alaska Department of Fish and Game).

[3] Years designated without any data (designated by a -) reflect no recorded information.

In GMU 1A, the WAA's with the highest marten harvests are those which are adjacent to or within short distances of Ketchikan and Meyers Chuck. The National Forest lands in these WAA's range from 3 to 11 percent roaded and 3 to 8 percent of the productive old growth logged. On State and Private lands, 100 percent of the old growth has been logged.

In GMU 1B, WAA 1605 is close to Petersburg, but WAA 1813 is not close to any community. Both WAA's have had some roading and logging on National Forest land.

In GMU 1C, a WAA immediately adjacent to Juneau and two WAA's in which state and private lands have been extensively logged have had the highest marten harvests.

In GMU 2, the WAA's immediately adjacent to the communities of Craig, Klawock, Hollis, and Hydaburg receive the highest marten harvests. On National Forest lands, percent of area roaded ranges from 3 to 33 percent, and percent of old growth logged ranges from 1 to 33 percent. On State and private lands, percent of old growth logged ranges from 14 to 100 percent.

In GMU 3, the WAA's adjacent to Petersburg and Kake have the highest marten harvests. On National Forest lands, percent of area roaded ranges from 23 to 58 percent, and percent of old growth logged ranges from 7 to 17 percent. On State and private lands, percent of old growth logged ranges from 44 to 99 percent.

In GMU 4, the WAA's adjacent to or within relatively short distances of Hoonah, Sitka, and Pelican receive the highest marten harvests. On National Forest lands, percent of area roaded ranges from 0 to 36 percent, and percent of old growth logged ranges from 0 to 21 percent. On State and private lands, percent of old growth logged ranges from 0 to 100 percent.

In GMU 5A, the WAA's adjacent to Yakutat receive the highest marten harvests. On National Forest lands, four percent of the area has been roaded, and six percent of the old growth has been logged. On State and private lands, 100 percent of the old growth has been logged.

Table 3-195

Characteristics of the Wildlife Analysis Areas (WAA) which have had the highest Marten harvests in each Game Management Unit (GMU) during the 1984-87 period

		National Forest Lands				*State and Private Lands*			
WAA #	# of Marten Harvested 1980-87	Total Acres	Percent Roaded	1954 O.G. Acres[1]	Percent O.G. Cut	Total Acres	Original O.G.Acres[2]	Percent O.G. Cut	Nearby Town or Ferry Access
GMU 1A									
613	160	45,412	3	23,935	3	820	779	100	Ketchikan, Meyers Chuck
406	100	127,785	11	61,213	8	2,798	2,406	100	Ketchikan
GMU 1B									
1605	113	149,092	10	26,831	17	3,517	1,301	0	Petersburg
1813	110	236,589	9	38,746	14	921	350	0	-
GMU 1C									
2515	122	101,654	3	21,692	0	15,796	6,002	87	Juneau
2926	118	133,832	0	87,030	0	24,520	19,616	100	-
2927	103	150,649	0	69,602	0	2,724	1,743	100	-
GMU 2									
1318[3]	396	170,108	12	68,486	10	82,959	69,826	98	Craig, Klawock
1107	374	151,395	15	66,713	4	62,289	52,946	100	Hydaburg
1105	238	104,608	3	62,756	1	59,650	52,492	14	-
1317	229	61,625	33	32,691	33	8,752	7,964	61	Hollis
GMU 3									
2007	280	115,283	58	67,469	17	19,484	18,315	73	Petersburg
5136[3]	160	170,550	27	87,247	7	10,318	9,857	44	Petersburg
5131[3]	144	165,063	23	55,905	12	48,351	45,932	99	Kake
GMU 4									
3523[3]	790	117,030	14	49,927	6	36,343	25,727	100	Hoonah
3419[3]	173	128,851	1	33,235	0	2082	1080	100	Pelican
3001[3]	125	203,671	15	64,781	15	13,641	5,184	90	Sitka
3308	125	109,446	36	65,633	21	80	66	100	-
3627	116	27,375	22	18,211	9	0	0	0	Tenakee Springs
3417	111	137,909	0	21,762	0	825	495	0	-
3416	102	64,832	0	15,642	0	0	0	0	Sitka
3733	102	215,555	0	41,575	0	0	0	0	-
GMU 5A									
4503[3]	176	752,062	4	60,127	6	27,551	16,200	100	Yakutat

Source: Revision data base, Q1021, May 1991; Q200E91A, April 1991; State and Private lands data compiled by USDA State and Private Forestry; Planning Record, letter dated April 8, 1988.

[1] 1954 old growth acres are the total acres of productive old growth (Strata A, B, C, D).

[2] Original old growth acres are the total acres of productive forest land at the time the land was conveyed to the State or private entity.

[3] Some WAA's had boundary changes or were divided into more than one WAA. To be consistent in compiling marten data through the 1980's, the data for these WAA's includes the following: data for WAA 1318 also includes WAA's 1332 and 1323; data for WAA 5136 also includes WAA's 5137, and 5138 (in the early 1980's these WAA's were combined into WAA 2009); data for WAA 5131 also includes WAA's 5132, and 5135 (in the early 1980's these WAA's were combined into WAA 2011); data for WAA 3523 also includes WAA's 4252 and 4253; data for WAA 3419 also includes WAA 3421; data for WAA 3001 also includes WAA's 3002 and 3314; data for WAA 4503 also includes WAA 4508.

River Otter. Table 3-196 summarizes the river otter harvest within the Tongass National Forest. The annual river otter harvest has ranged from a high of 652 for the 1979-80 season to a low of 373 for the 1986-87 trapping season. A total of 3,974 river otters were harvested from 1979-80 through the 1986-87 seasons. During this period, 32 percent of the harvest came from Game Management Unit 4, 29 percent from Unit 2, 14 percent from each of Units 3 and 1A, six percent from Unit 1C, four percent from Unit 1B, one percent from Unit 5A.

Data are not collected for total number of trappers or number of trapper-days for river otter or any of the other furbearing (trapped) species.

Appendix L contains river otter harvest information by ADF&G Wildlife Analysis Areas (WAA). Table 3-197 provides a listing of the WAA's which have had the highest river otter harvests during the 1979-80 to 1986-87 period in each Game Management Unit (GMU). The WAA's listed in Table 3-197 account for 25 percent of all river otters harvested on the Tongass during the 1979-80 to 1986-87 period. River otter trapping appears to be more evenly dispersed across the Tongass as compared to some of the previous species which have been discussed. However, the WAA's in Table 3-197 probably receive slightly higher river otter harvests due to their proximity to the communities of Ketchikan, Meyers Chuck, Craig and Klawock, Sitka, Petersburg, Wrangell, and Juneau. Boat access during the trapping season is probably more important than road access in most areas.

Table 3-196

Annual harvest of River Otter within the Tongass National Forest[1]

	Year								
Unit[2]	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88
1A	124	63	49	54	54	65	69	63	
1B	28	33	27	22	13	14	8	9	
1C	37	34	27	24	38	29	35	31	
1D	-[3]	2	-	-	-	-	-	-	
2	235	138	110	118	160	193	141	62	
3	54	90	76	67	46	141	51	45	
4	172	168	184	164	117	167	142	161	
5A	2	5	4	1	2	1	3	2	
Total	**652**	**533**	**477**	**450**	**430**	**610**	**449**	**373**	

Source: Planning Record dated April 8, 1988.

[1] 1987-88 harvest data for river otter was not available.

[2] Unit = Game Management Unit (Alaska Department of Fish and Game).

[3] Years designated without any data (designated by a -) reflect no recorded information.

Table 3-197

Characteristics of the Wildlife Analysis Areas (WAA) which have had the highest River Otter harvests in each Game Management Unit (GMU) during the 1979-80 to 1986-87 period

		National Forest Lands [1]				State and Private Lands [1]			
WAA #	# of Otter Harvested 1979-87	Total Acres	Percent Roaded	1954 O.G. .Acres[2]	Percent O.G. Cut[2]	Total Acres	Original O.G.Acres	Percent O.G. Cut	Nearby Town or Ferry Access
GMU 1A									
715	54	10,775	1	6,811	1	-	-	-	-
101	53	5,374	1	3,119	1	-	-	-	Ketchikan
GMU 1B									
1811	31	10,941	3	4,920	2	-	-	-	Wrangell
1817	23	8,990	0	6,832	0	-	-	-	Meyers Chuck
1603	21	11,859	5	4,048	8	-	-	-	Petersburg
GMU 1C									
2515	42	5,939	9	2,621	0	-	-	-	Juneau
2409	33	3,564	0	1,662	0	-	-	-	Juneau
GMU 2									
1318[3]	169	25,042	17	17,325	10	-	-	-	Craig, Klawock
1527[3]	168	16,533	61	12,165	22	-	-	-	N. Whale Pass, Coffman Cove
GMU 3									
1906	100	5,295	30	4,207	10	-	-	-	N. Whale Pass, Coffman Cove
1901[3]	66	40,713	12	26,879	4	-	-	-	-
5014[3]	56	72,406	6	53,014	2	-	-	-	-
GMU 4									
3001[3]	141	32,465	34	18,800	32	-	-	-	Sitka
GMU 5A									
4503[3]	17	74,547	7	9,730	13	-	-	-	Yakutat

Source: Revision data base, Q200E91A, April 1991; Planning Record, letter dated April 8, 1988.

[1] River Otter are associated with the beach and estuary fringe and riparian areas; the data for National Forest lands is for the beach and estuary fringes and riparian areas. Data for beach and estuary fringes and riparian areas was not available for the State and private lands.

[2] 1954 old growth acres was calculated by adding: (acres of Strata A, B, C, and D old growth) plus (acres of currently non-stocked, seedlings & saplings, and pole timber in the roaded areas). The acres cut since 1954 was calculated by adding the acres of currently non-stocked, seedlings & saplings, and pole timber in the roaded areas.

[3] Some WAA's had boundary changes or were divided into more than one WAA. To be consistent in compiling river otter data through the 1980's, the data for these WAA's includes the following: data for WAA 1318 also includes WAA's 1332 and 1323; data for WAA 1527 also includes WAA 1530; data for WAA 1901 also includes WAA 1910; data for WAA 5014 also includes WAA's 5016, 5017, and 5018 (in the early 1980's these WAA's were combined into WAA 2014); data for WAA 3001 also includes WAA's 3002 and 3314; data for WAA 4503 also includes WAA 4508.

Waterfowl. Table 3-198 summarizes waterfowl hunting statistics for Southeast Alaska. Data are not available for smaller geographic units in Southeast Alaska. Waterfowl hunters, hunter-days and harvest declined during the mid-1980's. The reason for the decline is not understood.

Table 3-198
Waterfowl hunting statistics for Southeast Alaska[1]

	1983	1984	1985	1986	1987	1988
Number of Hunters	2,446	2,114	1,840	1,655	-[2]	-
Number of hunter-days[3]	14,433	13,533	10,148	10,130	-	-
Annual Waterfowl Harvest						
Ducks	15,928	14,251	14,806	12,810	-	-
Seaducks	-	3,217	2,082	1,322	-	-
Cranes	-	14	0	0	-	-
Snipe	-	831	1,764	44	-	-
Geese	-	1,640	2,315	1,818	-	-

Source: Alaska Department of Fish and Game

[1] Waterfowl data are for all of Southeast Alaska; data are not available for smaller geographic units.

[2] Years without any data (designated by a -) reflect information not obtained.

[3] Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for 8 hours is also the equivalent of one hunter day.

Wildlife

Environmental Consequences

This section is divided into four parts:

- The first part discusses analysis which has been done to meet NFMA direction for maintaining viable populations of vertebrate species which are well distributed in the planning area.
- The second part (Direct, Indirect and Cumulative Effects) focuses on the potential effect each alternative may have on the habitat conditions and population trends of the Management Indicator Species (MIS).
- The third part is a brief discussion of wildlife habitats on adjacent, non-National Forest lands.
- The fourth part discusses harvest demand for species which are hunted or trapped.

The term "habitat capability" is used in describing the estimated changes in habitat conditions which may reflect population trends for various species of wildlife. Habitat capability is an estimate of the capability of various vegetation types and/or vegetation successional stages to support numbers of animals, habitat capability estimates may not be equal to actual population levels and may not even indicate population trends at any given point in time because populations fluctuate naturally due to a wide range of factors, such as extreme or mild winter weather, harvesting, and species interactions not accounted for in modeling the effects of Forest Service management actions. For example, bald eagle modeling uses nesting habitat as a primary indicator. Actual observed bald eagle populations have increased from about 7,200 in 1967 to 12,000 currently, while total estimated nesting habitat capability over the last 35 years has declined from about 20,000 to 18,000 eagles.

The environmental consequences for the MIS are displayed in relation to the estimated amount of habitat capability which existed on the Tongass in 1954 and in 1990. This is done to provide a cumulative effects analysis of timber harvesting from the beginning of the two long-term timber sale contracts. The 1954 habitat capabilities were derived by recreating old-growth forest conditions in the Revision data base for all second-growth timber stands identified in the Area's "Managed Stands Layer" as having been cut from 1954 to the present.

Timber harvest data suggests that most of the stands which have been harvested had timber volumes over 30 MBF per acre. Therefore, in recreating old-growth conditions that existed in 1954, all of the logged areas were given strata class C and D old growth attributes. If regenerating logged areas had tree species identified within them, then they received the old growth attribute for that species. If no tree species was identified, then a spruce/hemlock attribute was given. Much of the regeneration in logged areas is identified as spruce; spruce regenerates easily on sites after logging. Therefore, this approach may have biased the 1954 estimate of old growth more heavily to spruce than occurred naturally.

For each alternative, changes in habitat capability are presented for the years 2000 (or Decade 1), 2010 (or Decade 2), 2040 (or Decade 5), and 2150 (or Decade 15). This time frame allows the analysis to include the completion of the two long-term timber sale contracts and the effects of complete timber rotations.

For the MIS, analysis was done for each of ADF&G's Wildlife Analysis Areas (WAA's); this analysis is presented in Appendix L. Displays which follow in this section summarize the WAA analysis and show the results of the analysis for each Administrative Area and the Forest as a total.

Wildlife Resource

Introduction

NFMA implementing regulations direct that: "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well-distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well-distributed so that those individuals can interact with others in the planning area" (CFR 219.19). The following presents analysis which has been done to meet this NFMA direction. The analysis is presented in four parts: 1) threatened, endangered, candidate and sensitive species; 2) management indicator species; 3) other species; and, 4) a discussion of various recommendations and approaches from two task groups relating to population viability and distribution.

Threatened, Endangered, Candidate and Sensitive Species

Threatened, endangered, candidate and sensitive species are those plant and animal species which have been identified as currently having viability concerns. The section of the Supplement titled "Threatened, Endangered, Candidate and Sensitive Species," discusses the information and analysis for these species, and further discussion will not be presented here.

Management Indicator Species (MIS)

Population changes of Management Indicator Species (MIS) are believed to reflect the effects of land management activities. Evaluation of all species occurring within a planning area can be reduced through this concept to a number that promotes meaningful evaluation.

The distribution and abundance of MIS on the Forest was evaluated as part of the NFMA requirement for maintaining viable populations which are well distributed in the Planning area.

For the Tongass, habitat to ensure viable populations well-distributed is defined as habitat contained within Wilderness/Monument Areas (1,642,720 acres of productive old growth), legislated LUD II areas (266,180 acres of productive old growth), and other natural setting land use designations common to all alternatives (roughly 700,000 acres of productive old growth). All together, about 50 percent of the naturally occurring productive old growth is in legislated and natural setting areas on the Forest.

These habitat reserve areas are linked by protected beach and estuary fringes (at least 371,000 acres in Alternative D; 637,500 acres in all other alternatives), over 3,400,000 acres of unproductive old growth, over 7,000 inventoried bald eagle nests with 330 foot no timber harvest buffers, and roughly 20,000 miles of streams distributed throughout the planning area with 100 foot no commercial timber harvest buffers on each side of the stream providing about 397,000 acres of wildlife travel corridors.

The following approach to display distribution and abundance of MIS was used:

1. Use 21 Ecological Provinces as the basis for describing the distribution and abundance of the MIS (see Biological Diversity Section for the description of the Ecological Provinces).
2. Evaluate the distribution of Wilderness/Monuments Areas, Legislated LUD II Areas, and other Natural Setting Land Use Designations (LUD's) common to all alternatives within the context of the 21 Ecological Provinces. Figure 3-48 displays these areas, and Table 3-199 displays the acres within each of the 21 Ecological Provinces.
3. Using the MIS habitat capability models, evaluate the estimated habitat capability in the Wilderness/Monuments Areas, Legislated LUD II Areas, and other Natural Setting LUD's within each of the 21 Ecological Provinces. Table 3-199 displays the estimated MIS habitat capabilities.
4. Estimate the MIS habitat capability outside of the areas listed in #3, using a "maximum effects scenario" wherein all of the lands classified as tentatively suitable for timber management are harvested over a 150 year time period and receive their lowest value for each particular MIS. Table 3-199 displays the results of this analysis for each of the 21 Ecological Provinces.

Figure 3-48

Areas to Remain Natural within the Ecological Provinces in All Alternatives

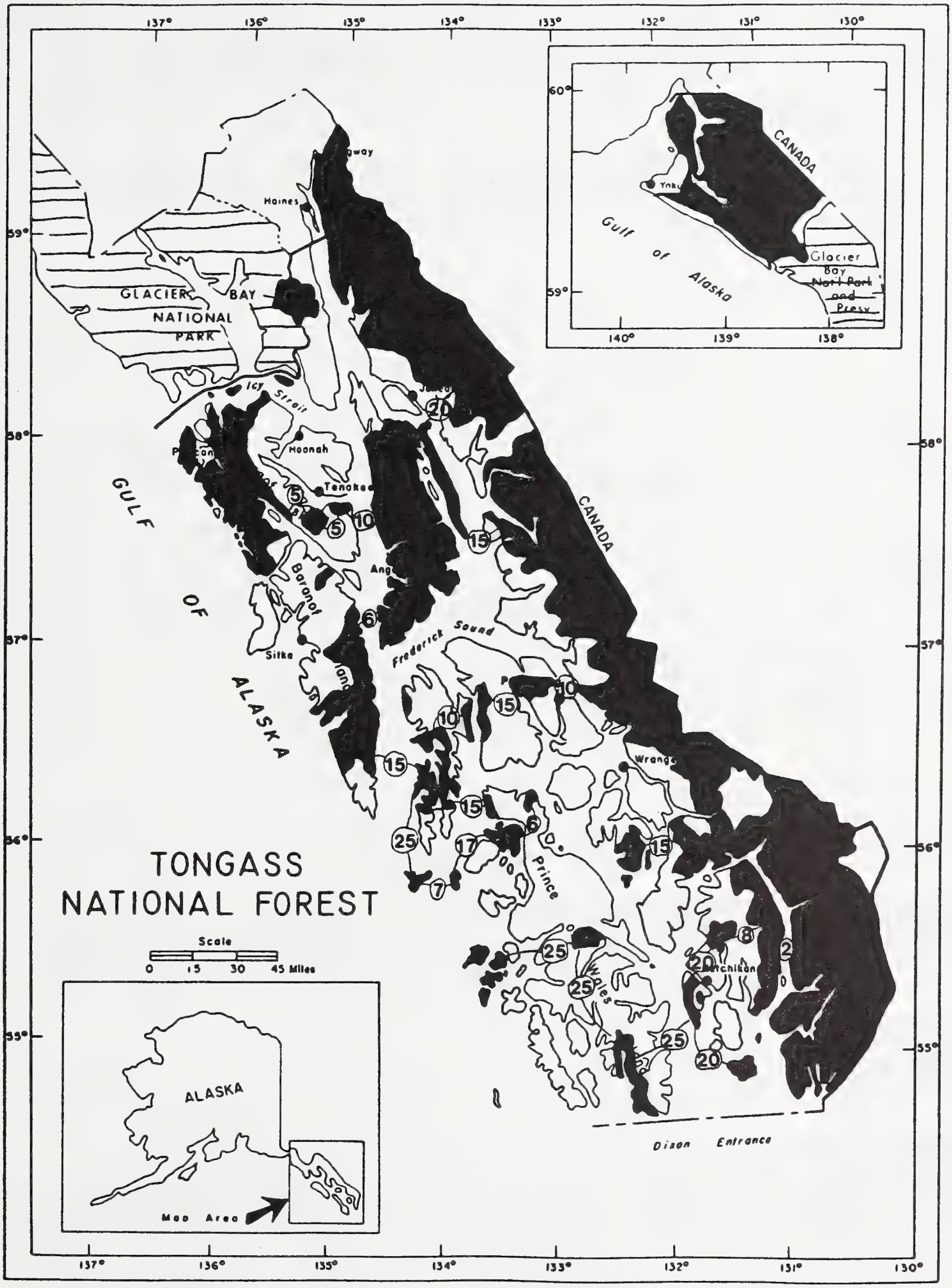


Table 3-199

Maximum potential effects analysis for the Ecological Provinces

	Ecological Province									
Viability Element	1	2	3	4	5	6	7	8	9	10
Tongass National Forest Acres	307,427	918,743	1,057,583	280,485	391,980	772,623	1,045,114	644,317	1,012,506	760,648
Acres Wilderness/Monument	5,713	343,001	61,881	230,343	90,497	224,274	976,235	97,409	251,231	47,635
Acres Legislated LUD II	136,893	2,143	284,933	16,468	0	0	0	42,915	0	0
Acres Other Natural Setting, All Alts.	90,908	64,862	0	0	110,674	0	0	213,030	234,445	24,285
Percent W/M, LUD II & Natural Setting	76	45	33	88	51	29	93	55	48	9
Acres Productive Old Growth	49,137	24,737	408,484	69,472	95,287	216,342	586,793	152,917	321,945	313,446
Acres Unproductive Old Growth	35,927	7,933	153,960	101,472	72,257	193,818	219,190	100,875	135,170	278,810
Acres Tentatively Suitable Old Growth	23,585	744	193,157	6,838	49,575	89,871	26,922	81,718	163,703	176,862
Percent of Tent. Suit. Productive OG	48	3	47	10	52	42	5	53	51	56
Management Indicator Species										
Black Bear Wilderness/Monument	6	127	0	0	0	0	0	82	233	84
Black Bear Legislated LUD II	91	1	0	0	0	0	0	51	0	0
Black Bear Other Natural Setting	73	12	0	0	0	0	0	210	198	44
Black Bear All Other Worst Case	32	9	0	0	0	0	0	203	477	779
Total Black Bear	202	149	0	0	0	0	0	546	908	907
Brown Bear Wilderness/Monument	1	49	74	246	69	233	1,330	22	35	0
Brown Bear Legislated LUD II	35	0	336	18	0	0	0	14	0	0
Brown Bear Other Natural Setting	27	5	0	0	89	3	0	58	62	0
Brown Bear All Other Worst Case	11	78	685	35	172	532	61	64	76	0
Total Brown Bear	74	132	1,095	299	330	768	1,391	158	173	0
Deer Wilderness/Monument	0	0	1,222	6,361	426	2,171	29,528	0	0	510
Deer Legislated LUD II	0	0	5,104	217	0	0	0	118	0	0
Deer Other Natural Setting	0	0	0	0	695	5	0	167	0	906
Deer All Other Worst Case	0	0	8,667	604	1,724	11,276	1,165	630	1,734	9,571
Total Deer	0	0	14,993	7,182	2,845	13,452	30,693	915	1,734	10,987
Mountain Goat Wilderness/Monument	0	42	0	0	94	150	0	12	316	0
Mountain Goat Legislated LUD II	3	0	0	0	0	0	0	25	0	0
Mountain Goat Other Natural Setting	0	53	0	0	197	237	0	405	470	0
Mountain Goat All Other Worst Case	3	95	0	0	291	387	0	442	786	0
Total Mountain Goat	6	190	0	0	582	774	0	884	1,572	0
Marten Wilderness/Monument	8	95	42	241	52	199	1,540	40	173	75
Marten Legislated LUD II	108	1	333	20	0	0	0	37	0	0
Marten Other Natural Setting	66	5	0	0	63	1	0	124	88	53
Marten All Other Worst Case	29	10	494	29	90	429	57	137	295	633
Total Marten	211	111	869	290	205	629	1,597	338	556	761
Red Squirrel Wilderness/Monument	4,626	129,829	37,340	127,086	32,891	98,829	641,720	37,944	97,113	29,292
Red Squirrel. Legislated LUD II	136,008	1,330	169,477	10,442	0	0	0	23,070	0	0
Red Squirrel Other Natural Setting	68,190	18,301	0	0	42,925	736	0	83,582	86,366	17,089
Red Squirrel All Other Worst Case	34,235	11,187	257,863	16,230	58,122	230,237	23,382	76,706	171,969	274,794
Total Red Squirrel	243,059	160,647	464,680	153,758	133,938	329,802	665,102	221,302	355,448	321,175
Wolf Wilderness/Monument	0	1	0	0	0	0	0	1	3	3
Wolf Legislated LUD II	5	0	0	0	0	0	0	1	0	0
Wolf Other Natural Setting	3	0	0	0	0	0	0	4	3	3
Wolf All Other Worst Case	3	2	0	0	0	0	0	6	13	45
Total Wolf	11	3	0	0	0	0	0	12	19	51
River Otter Wilderness/Monument	3	14	36	84	33	108	395	2	70	31
River Otter Legislated LUD II	55	0	199	12	0	0	0	28	0	0
River Otter Other Natural Setting	47	2	0	0	42	0	0	53	63	33
River Otter All Other Worst Case	24	4	343	28	54	286	29	125	220	340
Total River Otter	129	20	578	124	129	394	424	208	353	404

Table 3-199 (continued)

Ecological Province											
11	12	13	14	15	16	17	18	19	20	21	Forest Totals
483,651	721,158	500,119	1,260,553	1,169,559	213,964	109,899	370,594	971,413	904,304	3,008,595	16,905,235
127,020	278,170	82,122	39,868	240,118	33,597	0	85,431	794,936	904,304	990,598	4,913,785
3,292	0	0	68,312	69,664	74,564	0	21,583	0	0	2,298	723,065
37,840	115,655	0	0	204,906	0	0	0	43,495	0	1,731,400	2,871,500
35	55	16	9	44	51	0	29	86	100	91	50
297,322	242,047	228,123	547,590	523,700	115,962	64,953	167,833	198,205	311,665	114,802	5,050,762
91,402	159,276	187,590	414,436	460,297	70,764	29,898	2,604	244,428	326,556	143,241	3,429,904
148,514	93,197	133,827	412,913	290,756	44,543	51,458	99,876	20,107	0	25,573	2,133,739
50	39	59	75	56	38	79	60	10	0	22	42
233	281	132	65	376	58	0	137	858	1,349	295	4,316
6	0	0	115	116	134	0	39	0	0	3	556
65	96	0	0	256	0	0	0	56	0	305	1,315
268	375	426	932	687	82	99	247	118	0	143	4,877
572	752	558	1,112	1,435	274	99	423	1,032	1,349	746	11,064
0	74	0	0	0	0	0	0	227	334	92	2,786
0	0	0	0	15	0	0	0	0	0	1	419
0	24	0	0	39	0	0	0	14	0	107	428
0	79	0	0	74	0	0	0	34	0	42	1,943
0	177	0	0	128	0	0	0	275	334	242	5,576
6,807	2,063	3,055	828	3,538	2,303	0	3,825	1,087	7,143	0	70,867
218	0	0	2,887	624	4,512	0	552	0	0	1	14,233
1,143	262	0	0	4,971	0	0	0	201	0	41	8,391
5,299	3,329	4,694	16,286	8,624	2,376	2,926	4,885	134	0	160	84,084
13,467	5,654	7,749	20,001	17,757	9,191	2,926	9,262	1,422	7,143	202	177,575
0	267	0	0	153	0	0	0	1,340	968	1,036	4,378
0	0	0	0	3	0	0	0	0	0	3	34
0	273	0	0	279	0	0	0	210	0	1,874	3,998
0	540	0	0	435	0	0	0	1,550	968	2,913	8,410
0	1,080	0	0	870	0	0	0	3,100	1,936	5,826	16,820
303	209	116	63	314	71	0	141	403	949	104	5,138
10	0	0	130	87	155	0	37	0	0	1	919
71	61	0	0	270	0	0	0	75	0	14	891
260	257	174	705	485	66	95	197	10	0	105	4,557
644	527	290	898	1,156	292	95	375	488	949	224	11,505
95,107	119,748	54,792	0	148,726	0	0	0	262,370	452,828	97,172	2,467,413
3,707	0	0	0	39,989	0	0	0	0	0	596	384,619
25,149	43,916	0	0	142,128	0	0	0	18,114	0	136,002	682,498
96,534	120,594	133,313	0	248,260	0	0	0	36,396	0	40,193	1,830,015
220,497	284,258	188,105	0	579,103	0	0	0	316,880	452,828	273,963	5,364,545
24	12	12	4	17	7	0	14	15	39	3	155
1	0	0	11	3	15	0	2	0	0	0	38
5	3	1	0	22	0	0	0	2	0	6	52
22	19	22	71	44	10	11	20	1	0	2	291
52	34	35	86	86	32	11	36	18	39	11	536
237	73	68	19	76	40	0	89	96	263	10	1,747
10	0	0	69	22	93	0	10	0	0	0	498
34	37	0	0	133	0	0	0	14	0	32	490
170	153	120	440	278	57	50	105	33	0	24	2,883
451	263	188	528	509	190	50	204	143	263	66	5,618

Table 3-199 (continued)

Viability Element	Ecological Province 1	2	3	4	5	6	7	8	9	10
Bald Eagle Wilderness/Monument	7	21	92	226	91	304	1,035	3	185	62
Bald Eagle Legislated LUD II	101	0	561	32	0	0	0	60	0	0
Bald Eagle Other Natural Setting	106	1	0	0	128	1	0	97	115	89
Bald Eagle All Other Worst Case	57	4	534	78	91	667	60	226	403	689
Total Bald Eagle	271	26	1,187	336	310	972	1,095	386	703	840
Red-breast. Sapsucker Wilderness/Monument	544	4,326	3,736	12,426	2,931	11,479	90,909	3,063	11,507	4,192
Red-breast. Sapsucker Legislated LUD II	3,091	51	18,945	1,088	0	0	0	2,644	0	0
Red-breast. Sapsucker Other Natural Setting	1,836	155	0	0	3,473	44	0	8,702	6,054	2,725
Red-breast. Sapsucker All Other Worst Case	974	407	24,966	1,532	5,019	23,195	2,552	8,055	20,070	28,223
Total Red-breasted Sapsucker	6,445	4,939	47,647	15,046	11,423	34,718	93,461	22,464	37,631	35,140
Hairy Woodpecker Wilderness/Monument	31	444	361	799	158	788	11,996	245	1,244	418
Hairy Woodpecker Legislated LUD II	544	3	1,926	116	0	0	0	228	0	0
Hairy Woodpecker Other Natural Setting	302	11	0	0	280	2	0	682	389	263
Hairy Woodpecker All Other Worst Case	194	46	2,391	118	359	1,617	282	805	2,020	2,025
Total Hairy Woodpecker	1,071	504	4,678	1,033	797	2,407	12,278	1,960	3,653	2,706
Brown Creeper Wilderness/Monument	4	261	428	332	28	297	14,093	183	522	206
Brown Creeper Legislated LUD II	1,303	0	1,469	54	0	0	0	111	0	0
Brown Creeper Other Natural Setting	708	7	0	0	113	0	0	366	112	172
Brown Creeper Other Worst Case	402	60	1,684	15	137	391	356	561	1,576	1,234
Total Brown Creeper	2,417	328	3,581	401	278	688	14,449	1,221	2,210	1,612
VC Goose Wilderness/Monument	0	0	45	8	0	2	38	0	138	168
VC Goose Legislated LUD II	13	1	456	25	0	0	0	46	0	0
VC Goose Other Natural Setting	26	7	0	0	55	1	0	183	143	103
VC Goose All Other Worst Case	5	0	741	34	150	597	122	204	484	1,893
Total Vancouver Canada Goose	44	8	1,242	67	205	600	160	433	765	2,164

Table 3-199 (continued)

					Ecological Province						
11	12	13	14	15	16	17	18	19	20	21	Forest Totals
625	255	172	40	188	95	0	181	229	676	20	4,507
35	0	0	151	48	195	0	23	0	0	0	1,206
95	79	0	0	271	0	0	0	33	0	60	1,075
367	286	228	766	434	75	115	179	69	0	27	5,355
1,122	620	400	957	941	365	115	383	331	676	107	12,143
15,108	12,727	6,799	3,117	18,321	4,013	0	6,622	28,732	61,038	8,109	309,699
453	0	0	6,755	5,677	8,817	0	1,810	0	0	68	49,399
3,523	5,411	0	0	14,874	0	0	0	2,693	0	6,866	56,356
11,844	14,981	14,335	28,048	25,777	2,689	4,750	7,438	3,574	0	3,780	232,209
30,928	33,119	21,134	37,920	64,649	15,519	4,750	15,870	34,999	61,038	18,823	647,663
2,024	1,447	613	599	2,024	437	0	615	2,437	4,893	686	32,259
79	0	0	919	689	843	0	444	0	0	3	5,794
421	418	0	0	1,389	0	0	0	197	0	441	4,795
1,334	1,421	1,066	2,832	2,452	202	473	953	320	0	264	21,174
3,858	3,286	1,679	4,350	6,554	1,482	473	2,012	2,954	4,893	1,394	64,022
1,013	1,234	327	1,113	945	238	0	690	1,800	2,434	614	26,762
83	0	0	1,082	462	582	0	1,083	0	0	0	6,229
331	96	0	0	664	0	0	0	51	0	90	2,710
1,344	956	578	3,775	1,507	104	311	1,793	238	0	156	17,178
2,771	2,286	905	5,970	3,578	924	311	3,566	2,089	2,434	860	52,879
438	0	270	100	4	12	0	6	0	0	0	1,229
11	0	0	190	177	213	0	51	0	0	2	1,185
135	185	0	0	450	0	0	0	93	0	242	1,623
549	612	903	1,764	1,240	180	108	419	177	0	152	10,334
1,133	797	1,173	2,054	1,871	405	108	476	270	0	394	14,371

The following discussion provides a summary of the results of this analysis.

Fifty percent of the Tongass National Forest acres are within Wilderness/Monuments, Legislated LUD II's, or other Natural Settings LUD's common to all alternatives. Every Ecological Province except for #17 (Dall Island) contains some of these acres, comprising from between nine percent and 100 percent of the total acres within a particular province (Table 3-199).

There are 5.05 million acres of productive old growth that are considered to be important habitat for old growth associated wildlife species, and 3.4 million acres of unproductive old growth which also provides some level of habitat for old growth associated wildlife species.

Every ecological province contains both productive and unproductive old growth. There are 2.1 million acres of productive old growth that is currently classified as tentatively suitable for timber management. Every ecological province except for #20 (Southern Misty Fiords) contains some of the tentatively suitable acres. The tentatively suitable acres comprise 42 percent of the total productive old growth acres on a Forest-wide basis; the tentatively suitable acres comprise from 3 percent to 79 percent of the productive old growth acres within a particular province (Table 3-199).

Conifer old-growth Strata Classes B, C, and D in Beach, Riparian and below 800 feet elevation are generally considered higher quality wildlife habitat; Strata Class A in all areas and all productive old growth (Strata Classes A, B, C, and D) above 1500 foot elevation is generally considered poorer quality habitat for most of the management indicator species. Table 3-62, Estimated changes in productive conifer old-growth acres by alternative for 150 years for five landscape positions, is displayed in the Old Growth Forest Environmental Consequences section of this chapter. These higher quality habitats were estimated to total 2,916,854 acres in 1954 (37 percent of the total productive old growth at that time). In 1990, it has been estimated that 2,558,187 acres of the higher quality habitat remain (88 percent). Under a maximum potential effects scenario, after 150 years of implementation, 1,724,408 acres (59 percent) of the higher quality habitat is estimated to remain.

Black Bear. Black bear are present in all ecological provinces except for the five provinces which comprise Admiralty, Baranof, and Chichagof Islands. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 99 bears in Province #17 to 1,435 bears in Province #15. Province #17 includes Dall and Long Islands, and the number of black bears in Province #17 is related primarily to the size of the islands. Black bear are also present on smaller islands with less habitat capability than Dall and Long Islands.

Forest-wide and Standards and Guidelines (see Chapter 4 of the Proposed Revised Forest Plan) have been developed to reduce chances of human/bear conflicts, including:

1. Phase out and rehabilitate all existing open garbage sites on National Forest land.
2. Require incinerators and/or other bearproof garbage facilities at all camps, recreation sites, and special use authorizations.
3. When necessary to reduce habituation of bears or to reduce human/bear incidents, implement special regulations requiring storage of human food in ways to make it unavailable to bears.

Brown Bear. Brown bear are present in all ecological provinces except for the seven provinces which comprise the islands south of Frederick Sound. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges

from 74 bears in Province #1 to 1,391 bears in Province #7. Province #1 is the Yakutat Forelands; the province is also adjacent to other areas with brown bears (Province #2 and Glacier Bay National Park), so this bear population is not isolated.

Forest-wide and Standards and Guidelines (see Chapter 4 of the Proposed Revised Forest Plan) have been developed to reduce chances of human/bear conflicts, including:

1. Phase out and rehabilitate all existing open garbage sites on National Forest land.

2. Require incinerators and/or other bearproof garbage facilities at all camps, recreation sites, and special use authorizations.

3. Locate seasonal and permanent camps, recreation facilities, mineral exploration and operational facilities, log dumps and transfer facilities more than 1 mile from sites of seasonal brown bear concentrations.

4. When necessary to reduce habituation of bears or to reduce human/bear incidents, implement special regulations requiring storage of human food in ways to make it unavailable to bears.

5. Where practicable, roads should not be built within 300 feet of important salmon-bear streams, except as necessary to cross the stream at a nearly perpendicular angle to the stream. Where roads are joined to communities (ferry and road access to greater than 1000 people), open road density should not exceed 1.0 mile of Forest development roads per square mile of roaded area within a Wildlife Analysis Area (1990 ADF&G Wildlife Analysis Area Map) that supports a bear population. Roads which are closed and made unusable for motorized traffic by administrative closure and gating, ditching, and barricading after management activities are not included in calculating open road density. In areas where the coastline is accessible by boat comparable to road access, the length of coastline should be considered in road management plans.

6. Address the effects of off-highway vehicle (OHV) disturbance on brown bear habitats and populations in OHV management plans and project plans.

Sitka Black-tailed Deer. Deer are present in all ecological provinces except the two provinces at Yakutat. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 202 deer in Province #21 to 30,693 deer in Province #7. The small number of deer in Province #21 is expected because this province is primarily rock and ice at higher elevations and naturally would not sustain very high deer numbers.

Mountain Goat. Mountain goat are present in 11 ecological provinces. Historically, mountain goats were only present on the mainland (8 of the ecological provinces). Through cooperative transplant work, mountain goats are now present on Revillagigedo and Baranof Islands. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from three animals in Province #1 to 2,913 animals in Province #21. The three animals in Province #1 is due to the fact that goat habitat is naturally absent in the province. Most of the mountain goat habitat on the Forest is allocated to Wilderness/ Monuments and natural setting LUD's in all alternatives. Therefore, the alternatives have little or no effect on goat habitat capability.

Marten. Marten are present in all ecological provinces. Historically, they were only present on the mainland (8 provinces) and possibly Mitkof, Kupreanof, and Kuiu Islands (2 provinces). Through cooperative transplant work, marten are now present on most of the islands (there's further discussion in the affected environment in this section). The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 95

animals in Province #17 to 1,597 animals in Province #7. Province #17 includes Dall and Long Islands; the number of animals within the province is primarily a factor relating to the size of the islands. Marten are present on smaller islands with less habitat capability than Dall and Long Islands, and appear to be sustaining populations.

Forest-wide and Standards and Guidelines direct project level analysis to utilize the old growth patch size relationships for the MIS (including marten) to minimize adverse effects of fragmentation to the extent possible. Standards and guidelines provide for road management objectives to be established at the project level to consider resource values. If the need to restrict access is identified during project interdisciplinary review, roads can be closed, either seasonally or year-long, to minimize adverse effects on fish and wildlife.

Of all the Management Indicator Species, many wildlife biologists believe marten is the most important as it relates to habitat needs and dispersal distances between habitats. Marten habitat may serve the needs of most of the MIS. Table 3-199, Maximum Potential Effects, shows that Wilderness, Monuments, Legislated LUD II, and natural setting prescriptions common to all alternatives will provide habitat capability for an estimated 6,948 marten in the planning area on National Forest land. The information displayed in the table further breaks down the habitat capability by each of the 21 Ecological Provinces and separates Wilderness/Monument, legislated LUD II, and natural settings.

Table 3-201 indicates the acreages of large blocks of productive old growth within Wilderness/ Monument, legislated LUD II, and natural setting areas and the dispersal distances between the habitats. Note that five Management Areas could have dispersal distances of 25 miles between large contiguous blocks of productive old growth, eleven management areas could have 15-20 mile dispersal distances and all others have dispersal distances of 10 miles or less. In a study of radio-collared marten on northeast Chichagof Island, within one year, juvenile marten have moved up to 25 miles from their original capture point (Flynn, 1991).

Further study is needed to fully understand the food habits, denning, and dispersal capabilities of marten in Southeast Alaska. However, based on the information available to date, those habitat areas with dispersal distances greater than 15 miles could be assumed to potentially have a higher risk of not providing interaction of animals between habitats over the long term. Those management areas with dispersal distances greater than 10 miles include: C11A, C42, C49, S15, S24, S32, K12, K13A, K16, K27A, K41 and K42.

In every case but one, management areas with dispersal distances greater than 10 miles are separated by a large body of water which is a natural barrier to marten. The one exception, K16 (Karta Wilderness) to K27a (Nutkwa legislated LUD II), has had harvesting already occur in the VCU's 620 and 621 which is the corridor between K16 and K27a. Class I and Class II stream buffers, unproductive old growth, and beach fringe still link these areas, however, there may be breaks in the corridors. This is the only pair of habitats in natural setting prescriptions that has a high risk of the dispersal distance (greater than 15 miles) and related travel corridor(s) impeding movement of marten between these habitats.

Red Squirrel. Red squirrels are present in all ecological provinces except four (provinces 14, 16, 17, 18). Historically, they were only present on the mainland (8 provinces). Through cooperative transplant work, red squirrels are now present on most of the islands except the four provinces listed above. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 133,938 animals in Province #5 to 665,102 animals in Province #7.

Gray Wolf. Wolves are present in all ecological provinces except the five provinces which comprise Admiralty, Chichagof, and Baranof Islands. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from three animals in Province #2 to 86 animals in each of provinces 14 and 15. Province #2 is the Yakutat Uplands, and wolf habitat capability is naturally low in this province because of the naturally small number of prey species.

Currently, the State of Alaska authorizes a year-long open hunting and trapping season for wolves in Southeast Alaska, with no limit on the number of wolves which can be harvested. Concern has been expressed for the potential to overharvest wolves. Forest-wide Standards and Guidelines (see Chapter 4 of the Proposed Revised Forest Plan) addressing open road densities have been developed to address this concern.

River Otter. River otter are present in all ecological provinces. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 20 animals in Province #2 to 578 animals in Province #3. Province #2 has low river otter numbers because it naturally lacks the beach fringe and riparian habitats necessary for river otter habitat.

Bald Eagle. Bald eagles are present in all ecological provinces. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 26 eagles in Province #2 to 1,187 eagles in Province #3. Province #2 has low bald eagle numbers because it naturally lacks the beach fringe and riparian habitats necessary for bald eagle habitat. Each of the alternatives increases the habitat capability for bald eagles by varying amounts above the levels described here due to application of Riparian Management Standards and Guidelines and allocation of the beach fringe to natural setting LUD's. All bald eagle nests are managed according to an Interagency Agreement between the Forest Service and the U. S. Fish and Wildlife Service. The Forest-wide Standards and Guidelines (see Chapter 4 of the Proposed Revised Forest Plan) include:

1. Maintain a minimum 330-foot radius habitat management zone around each bald eagle nest tree.

2. Any variance considered will follow the interagency agreement with the U.S. Fish and Wildlife Service

3. Maintain habitats for perching and winter roosting.

4. Recognize that blasting within one-half mile of eagles or active nests can result in significant disturbance. The following guidelines are recommended to avoid disturbance and help prevent need for variances:

   a) September 1 to February 28 (nonbreeding season): Normal blasting procedures are permitted if there is no direct danger to eagles, nests, eagle nest trees, or other eagle habitat elements.

   b) March 1 to May 31 (nest site selection): Controlled blasting is allowed within one-half mile of an active bald eagle nest provided that 1) the blasting can be accomplished in accordance with the requirements of the Bald Eagle Protection Act; 2) written coordination with the Fish and Wildlife Service has occurred; 3) the results of the interagency coordination are documented.

   c) June 1 to August 31 (nesting period): If the nest is unoccupied, guidelines under (a) apply. If the nest is occupied, guidelines under (b) apply.

d) Topographical features and/or special blasting procedures will be considered to allow blasting within the one-half mile zone.

5. Avoid repeated helicopter flights within 1/4 mile of active bald eagle nests, particularly with large helicopters used for yarding timber. Heliports and helicopter logging flight corridors will maintain at least a 1/4 mile distance from active nests.

Red-breasted Sapsucker. Red-breasted sapsuckers are present in all ecological provinces. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 4,750 birds in Province #17 to 93,461 birds in Province #7. Each of the alternatives increases the habitat capability for red-breasted sapsuckers by varying amounts above the levels described here due to additional productive old growth being allocated to natural setting LUD's. Forest-wide and Standards and Guidelines (see Chapter 4 of the Proposed Revised Forest Plan) have been developed to provide for cavity nesting habitats, including:

1. Use the following chart as a guide for snags:

Numbers of Snags* Required Per 100 Forested Acres To Support Various Percentages Of Maximum Woodpecker Populations In Southeastern Alaska**

	Percent of Maximum Populations									
Species	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%
Red-breasted Sapsucker	160%	144%	128%	112%	96%	80%	64%	48%	32%	16%
Hairy Woodpecker	672%	605%	538%	470%	403%	336%	269%	202%	134%	67%

Source: Habitat Capability Models - Appendix B

* Soft and hard snags which are >15 inches dbh and >10 feet in height

** Forested acres refers to all lands capable of supporting 10 percent tree cover

2. Maintain an average of 275 snags per 100 forested acres on a fourth order watershed basis.

Hairy Woodpecker. Hairy woodpeckers are present in all ecological provinces. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 473 birds in Province #17 to 12,278 birds in Province #7. The Forest-wide and Standards and Guidelines for cavity nesting habitat apply.

Brown Creepers. Brown creepers are present in all ecological provinces. The estimated habitat capability after a 150 year maximum effects analysis (using the 4 steps outlined above) ranges from 311 birds in Province #17 to 14,449 birds in Province #7. The Forest-wide and Standards and Guidelines for cavity nesting habitat apply.

Vancouver Canada Goose. Geese are present in all ecological provinces (habitat capability for geese is not presented for Province #20 because the necessary soil/plant association data necessary to estimate goose habitat capability is lacking for this province). The estimated habitat capability ranges from 8 geese in Province #2 to 2,164 geese in Province #10. Province #2 is the Yakutat Uplands, and has a low habitat capability due to the natural absence of suitable habitat. Forest -wide Direction and Standards and Guidelines (see Chapter 4 of the Proposed Revised Forest Plan) for waterfowl habitat have been developed to provide for productive waterfowl habitats, focusing on:

1. Maintaining or improving wetland habitats which receive high use by waterfowl species such as ducks, geese and shorebirds by:

   a. locating facilities and concentrated human activities as far from known waterfowl concentration areas as practicable;

   b. minimizing disturbance of geese and waterfowl by restricting, when practical, development activities to periods when geese and waterfowl are absent from the area;

   c. maintaining habitat capability in coastal wetlands and intertidal areas that are important migratory staging areas and fall/winter/spring concentration areas, and wetlands that are important nesting and brood-rearing habitats, by avoiding where practical, all development activities which could fill wetlands, drain wetlands, or alter water levels resulting in loss of desirable vegetation, or direct loss of habitat;

   d. timing management activities within 410 feet (125 meters) of geese habitat when geese are present during nesting, brood rearing, molting and wintering periods;

   e. reducing human disturbance with the following guidelines:

      - For aircraft flights on Forest Service approved projects, when weather ceilings permit: 1,500 feet (458 meters) above ground level for helicopters; 500 feet (153 meters) above ground level for fixed-wing aircraft; 1 mile (1.6 km) horizontal distance and 1,000 feet (305 meters) above ground level for helicopters from molting sea ducks; 1,000 feet (305 meters) above ground level for fixed-wing aircraft over habitat used by molting geese.

      - Provide a minimum distance of 410 feet (125 meters) between human activities on the ground and areas being used by geese and other waterfowl.

   f. regulating off-highway vehicle use to prevent degradation of habitat or adverse disturbance of populations;

   g. developing waterfowl habitat improvement projects in cooperation with appropriate State and Federal agencies;

   h. protecting and maintaining the soil and water quality and quantity from disturbances of waste discharge and fill material and other soil disturbances that lead to concentrations of surface water and soil erosion, which may lead to rill or gully erosion and subsequent water quality degradation;

   i. for Special Use Administration (non-recreational), issue only authorizations which meet the objectives of Executive Order 11990 (Protection of Wetlands).

   j. establishing road management objectives at the project level to consider resource values; objectives could include road closures either seasonally or year-long to minimize anticipated effects on waterfowl.

Under current conditions, by ecological province, there are no known viability concerns with any of the management indicator species.

Other Species Evaluated for Viability Concerns

An interagency task group consisting of biologists from the Forest Service, Alaska Department of Fish and Game, and U. S. Fish and Wildlife Service evaluated species for possible viability concerns during 1988. Some of the species evaluated included threatened, endangered, sensitive (TES), and Management Indicator Species (MIS), which are discussed in their own

sections. In addition to the TES and MIS species, the task group in 1988 evaluated the following species:

Mammals: Prince of Wales ermine, northern bog lemming, northern red-backed vole, Gapper's vole, Coronation Island vole, Sitka mouse

Birds: Tundra Swan, northern saw-whet owl, northern pygmy owl, western screech owl, great gray owl, Vaux's swift, black-backed woodpecker, red-eyed vireo, Tennessee warbler, Harris' sparrow, brown-headed cowbird, boreal owl, northern hawk owl, cinnamon teal, European widgeon, redhead, canvasback, common eider, pied-billed grebe, American bitter, marbled godwit, Hudsonian godwit, surfbird, red knot, red phalarope, pomerine jaeger, long-tailed jaeger, glaucous gull, California gull, ring-billed gull, sabines gull, thick-billed murre, parakeet auklet, horned puffin

Fish: Sockeye salmon, cutthroat trout

The task group developed the following criteria to help evaluate each of the above species for viability concerns:

1. Breeding habitat occurs in Southeast Alaska.
2. Key winter range occurs in Southeast Alaska.
3. Key migratory range occurs in Southeast Alaska.
4. Habitats are vulnerable to land management activities.
5. Habitats are vulnerable to catastrophic events.
6. There is high potential of extirpation within 300 years.
7. There is a high potential of extirpation within 300 years.
8. A species has limited dispersal capability or there are barriers to dispersal.
9. The geographic distribution of a species is limited or narrow within Southeast Alaska.
10. The geographic distribution of a species is limited to Southeast Alaska.
11. The geographic distribution is limited outside of Southeast Alaska.
12. Level of knowledge for the species in Southeast Alaska is limited.
13. Demographic characteristics for the species (natality & mortality rates) indicate slow rates of population increase.
14. Existing population numbers within Southeast Alaska are relatively low.
15. Existing population numbers outside Southeast Alaska are relatively low.
16. Population trends within Southeast Alaska are down.
17. Population trends throughout a species range are down.

The process used for rating a species with the 17 criteria was: relative to each species and each criteria, is there a high or moderate or low biologist concern for the viability of the species on the Tongass National Forest. As a result of this evaluation, the interagency task group recommended that all but two of the species listed above were probably not viability concerns in relation to the Tongass National Forest and the Tongass Forest Plan Revision. The task group did not have enough knowledge nor information on habitat requirements to evaluate two of the species: boreal owl and northern hawk owl. A need was identified to obtain more information for these two species. (Reference: Planning Records for Interagency Task Group Meetings of June 6, 1988, July 18, 1988, September 1 and 8, 1988).

An interagency task group consisting of biologists from the Forest Service, Alaska Department of Fish and Game, and U. S. Fish and Wildlife Service did additional evaluation of species for possible viability concerns during 1990/91. Some of the species evaluated included Management Indicator Species (MIS), which are discussed in their own section. In addition to the MIS, the task group in 1990/91 evaluated the following species:

Birds: Queen Charlotte Goshawk, Vaux's swift, northwest great blue heron, northern hawk owl, boreal owl

Plants: Alaska yellow-cedar, Pacific yew

Animals: northern spotted frog, northern flying squirrel

A brief summary of how the Supplement provides for the habitat and populations of these species follows.

Northwest Great Blue Heron. The following Forest-wide Standards and Guidelines were developed (see Chapter 4 of the Proposed Revised Forest Plan):

1. Protect active heron rookeries by maintaining the integrity of the rookery site, and regulating human use in the vicinity of the rookery. Prevent disturbance during the active nesting season (generally March 1 to July 31). Avoid direct aircraft flights on Forest Service permitted or approved activities. Within .25 miles (400 meters) of rookeries, maintain a minimum flight elevation of 660 feet, when weather ceilings permit.

Northern Hawk Owl. Analysis for the two cavity nesting MIS (red-breasted sapsucker and hairy woodpecker) indicated that necessary habitat for the northern hawk owl would be maintained. Application of the Forest-wide and Standards and Guidelines for cavity nesting species would also benefit owl habitat.

Prince of Wales Flying Squirrel. Discussion and analysis for the Prince of Wales Flying Squirrel is presented in the Threatened, Endangered, Candidate and Sensitive Species Section.

Vaux's Swift. In Alaska, there are no definite breeding records, but it is likely that Vaux's swift nests in Southeast Alaska (F. Samson, personnal communication). Analysis for the two cavity nesting MIS species (hairy woodpecker, red-breasted sapsucker) indicates there will be adequate habitat for the Vaux's swift if it does breed in Southeast Alaska. Application of the Forest-wide and Standards and Guidelines for cavity nesting species will benefit habitat for this species also.

Pacific Yew. The southern portion of the Tongass National Forest is the northern geographic range for Pacific Yew. A Research Natural Area (Dog Island RNA) was established to represent this northern limit of yew and the associated plant species and communities. Yew has been documented in the mixed conifer/salal, mixed conifer/blueberry/deercabbage, mixed conifer/blueberry-salal, and western hemlock-western redcedar/blueberry-salal plant associations. These plant associations generally occur on poor sites with low to moderate productivity. Within its documented range on the Tongass, there are 432,849 acres of Wilderness, Legislated LUD II, or other LUD II (this also includes the RNA); the full extent of yew in these areas is not known. The following Forest-wide Standard and Guideline applies:

Consider protecting known Pacific yew plants form commercial timber harvest activities and maintain their regeneration capabilities.

1. Locate existing plants during regular Forest Service project activities. Implement site-specific silvicultural prescriptions to protect the known plants and maintain their regeneration capabilities.

Alaska yellow-cedar. The following summarizes a report submitted to the viability committee by Demeo and Hauver (1990):

> On the Tongass, this species is still in the stronghold of its range. It grows on a wide range of sites, and, in fact, tends to dominate on poorer sites that are unlikely to be logged in the foreseeable future. It is well distributed throughout the Tongass, occurring in most VCU's. As a species, it is not likely to be eliminated either locally or regionally, as a result of timber harvest/road building activities.
>
> There is reasonable concern, however, for the species' decline in regard to long-term climatic trends. According to work by Paul Hennon of the Juneau FSL, the species is dying out at a faster than expected rate in some areas. While the reason for this remains unknown, the most likely explanation appears to be root mortality due to infrequent heavy snow winter, in turn influenced by a climatic warming trend.
>
> There is concern for the silviculture of Alaska yellow-cedar. The tree has a very slow growth rate and normally does not regenerate well following clearcut timber harvest. Dissemination of seed from parent trees is limited to 250-350 feet. Seed germination is sometimes low. It is recommended to develop silvicultural alternatives, such as seed tree techniques or planting, to regenerate the species.

Spotted Frog. Specimens or literature records for the spotted frog in Southeast Alaska include the Stikine River, Mitkof Island near Petersburg, and unconfirmed records for the Taku River area. The spotted frog is highly aquatic, always found near permanent water and the adjacent grassy margins of lakes, streams, and ponds (Planning Records, Spotted Frog Report, Nov. 1990). The viability committee did not identify viability concerns for the spotted frog. The types of habitats used by the spotted frog are normally not subject to development activities.

The application of Forest-wide Standards and Guidelines for wetlands and riparian areas will maintain habitats for this species. The Stream and Lake LUD and Fish and Water Quality LUD will maintain habitat conditions suitable for this species. Also, much of its known occupied range is within Wilderness Areas or other natural setting LUD's.

Queen Charlotte Goshawk. No research on goshawks in Southeast Alaska has been done, and the populations and habitat requirements are not known. After reviewing the literature from the Lower 48 and Canada, the viability committee estimated a relationship between the amount of old growth maintained in large old growth blocks and number of goshawk pairs (Table 3-200). In their estimation, old growth which was over 20,000 MBF per acre was to comprise from 25 to 50 percent of the total landscape (not counting glacier, alpine, and salt water) for the block to be useful for goshawks.

Table 3-200

Estimated relationship between the amount of old growth greater than 20,000 board feet to the acre within various sizes of landscapes and number of Goshawk Pairs.

Acres of Old Growth >20 MBF per acre	Total Size of Landscape (Acres)	Number of Goshawk Pairs
20,000	40,000 - 80,000	8
8,000	16,000 - 32,000	3
4,000	8,000 - 16,000	1-2

Source: Viability Committee Recommendations, Feb. 1991.

Numerous questions were raised about the viability committee's recommendations (see following section). Using the viability committee's recommendations for habitat needs of goshawks, an evaluation of the existing distribution of Wilderness/Monument Areas, Legislated LUD II Areas, and Natural Setting LUD's common to all alternatives for potential goshawk habitat capability on the Forest (Table 3-201) shows estimated habitat capability of 314 to 381 pairs of goshawks and dispersal distances between natural setting habitats. Table 3-202 displays the estimated goshawk habitat capability from these areas by the 21 Ecological Provinces.

Table 3-201

Estimated Goshawk habitat capability (# of pairs) within Wilderness/Monument areas, Legislated LUD II areas, and other natural setting LUD's common to all alternatives

Mgmt. Area	Productive Old Growth Acres[3] Strata B, C, D	Strata A	Unproductive Old Growth Acres	Estimated Capability # of Pairs[4]	Distance to Next Area
Wilderness/Monuments					
C11	10,696	23,183	28,969	0-3	Adjacent to C11a
C11a	30,455	12,995	8,789	11	15 Miles to C22
C16	4,962	10,021	19,877	0-1	5 Miles to C02 & C02a
C22	318,768	225,124	197,589	128	10 Miles to C37a
C23	4,998	6,599	7,943	0	5 Miles to C26
C38	15,724	44,931	105,803	0-5	Adjacent to C26 & C35
C49	17,456	47,510	80,576	0-5	15 Miles to C22
C52[1]	10,765	13,418	5,964	0-3	5 Miles to C56
S06	36,649	10,283	5,629	13	15 Mi. to C49; 10 Mi. to S12
S06a	23,238	14,436	10,497	8	Adjacent to S06; 15 Mi. to K03a
S15	11,717	10,999	20,099	4	15 Mi. to S34; 10 MI. to S12
S24	15,541	20,231	30,120	6	15 Mi. to S32
S34	38,113	32,107	34,323	15	10 Mi. to S15; Adjacent to S28
K12	11,373	10,658	8,762	0-3	25 Mi. to S06a; 17 Mi. to K03a
K16	16,876	4,319	11,396	7	25 Mi. to K13a & K27a
K27	12,672	19,482	47,038	5	Adjacent to K27a; 25 Mi. to K41
K43[2]	249,598	329,283	645,886	57-87	8 Mi. to K33; Adjacent to K31
Legislated LUD II's					
C02a	5,142	7,826	5,045	2	Adjacent to C02 & C04 & C05
C26	22,135	15,913	13,931	8	Adjacent to C35; 10 Mi. to C38
C35	14,609	26,793	24,949	5	Adjacent to C26 & C38
C36	10,275	9,795	8,755	3	5 Mi. to C35 & C37a
C37a	2,398	1,819	659	1	5 Mi. to C36; 10 Mi. to C22
C58[1]	10,693	5,826	12,535	0-3	Adjacent to C52 & C56
S09a	2,275	499	319	0	7 Mi. to S06
S32	7,583	8,663	16,506	3	15 Mi. to S24; Adjacent to K31
K02	2,406	2,068	4,519	1	6 MI. to K03a
K03a	21,057	12,446	15,438	8	6 Mi. to K02; 15 Mi. to S06a
K13a	19,210	26,175	25,981	8	25 Mi. to K16
K27a	10,361	2,460	5,061	3	25 Mi. to K16; Adjacent to K27
K33	13,136	4,619	10,097	5	8 Mi. to K43; 20 Mi. to K31/K41
Natural Setting					
C01	8,980	17,202	26,128	0-3	Adjacent to C02; 5 Mi. to C16
C02	5,487	11,272	10,570	0-1	Adjacent to C02; 5 Mi. to C16
C04	619	2,038	2,399	0	Adjacent to C05 & C09
C05	1,358	3,975	2,677	0	Adjacent to C04; 10 Mi. to C02a
C08	2,238	9,638	10,563	0	Adjacent to C09; 10 Mi. to C22
C09	5,156	10,654	7,754	0-2	10 Mi. to C22; Adjacent to C08
C42	2,005	2,486	2,606	0	15 Mi. to C47; 20 Mi. to C36
C47	4,060	7,419	12,377	0-1	6 Mi. to C22; 15 Mi. to C42
C56[1]	4,504	2,022	13,672	0-2	Adjacent to C58 & C52
C59[1]	223	423	589	0	Adjacent to C58 & C52
C60[1]	350	0	0	0	Adjacent to C58; Glacier Bay NP
C61[1]	1,397	320	2,739	0	Adjacent to C52 & C56

Table 3-201 (continued)

Mgmt. Area	Productive Old Growth Acres[3] Strata B, C, D	Strata A	Unproductive Old Growth Acres	Estimated Capability # of Pairs[4]	Distance to Next Area
S03	0	0	0	0	Adjacent to C11 & S34
S28	7,164	21,675	42,628	0-2	Adjacent to S34; 10 Mi. to K31
K31	26,923	26,225	41,645	8	Adjacent to S32 & K43
K41	8,300	9,848	17,668	3	20 Mi. to K33; 25 Mi. to K27
K42	3,075	4,263	34,707	0-1	20 Mi. to K41
Summary				**314-381**	

Source: Revision data base, Q200ELUD, May 1991.

[1] These acres represent the oldest tree stands in these areas, however, they may not contain all of the characteristics associated with old growth stands in the other provinces.

[2] The area is all of Misty Fiords National Monument/Wilderness; to estimate goshawk habitat capability this area was analyzed in smaller geographic units - only the summary is presented here.

[3] Strata B, C, D represent old growth acres with greater than 20,000 board feet per acre timber volume; Strata A represents old growth acres with 8,000 to 20,000 board feet per acre timber volume. Unproductive old growth is acres of old growth with less than 8,000 board feet per acre.

[4] For areas which do not meet the landscape requirements as recommended by the viability committee, a range of capabilities from zero to the upper limit is shown.

Table 3-202

Estimated Goshawk Habitat capability (# of pairs) by 21 Ecological Provinces

Province	Estimated # of Pairs	Province	Estimated # of Pairs
1	0-5	11	21
2	0-3	12	15
3	17	13	6
4	0-5	14	16
5	0-1	15	35
6	0-5	16	8-11
7	128	17	0
8	2-7	18	8
9	11-16	19	16-28
10	4	20	23-40
		21	0-2
		Total Forest-wide	**314-381**

Boreal Owl. A few owl surveys were conducted in Southeast Alaska from 1986 to 1988, in which seven boreal owl responses were recorded (Planning Records, Sept. 1 and 8, 1988). No boreal owl research has been done in Southeast Alaska, and populations and habitat requirements are not known. The viability committee estimated a relationship between the amount of old growth maintained in large old growth blocks and number of boreal owl pairs (Table 3-203). Old growth which was over 20,000 MBF per acre was to comprise from 25 to 50 percent of the total landscape (not counting glacier, alpine, and salt water) for the block to be useful for boreal owls.

Table 3-203

Estimated relationship between the amount of old growth greater than 20,000 board feet to the acre within various sizes of landscapes and number of Boreal Owl pairs

Acres of Old Growth >20 MBF per acre	Total Size of Landscape (Acres)	Number of Boreal Owl Pairs
20,000	40,000 - 80,000	24
8,000	16,000 - 32,000	9
4,000	8,000 - 16,000	4

Source: Viability Committee Recommendations, Feb. 1991.

Numerous questions were raised about the viability committee's recommendations (see following section). Using the viability committee's recommendations for habitat needs of boreal owls, an evaluation of the existing distribution of Wilderness/Monument Areas, Legislated LUD II Areas, and Natural Setting LUD's common to all alternatives, for potential boreal owl habitat capability on the Forest (Table 3-204), shows an estimated habitat capability of 947 to 1,147 pairs of boreal owls. Table 3-205 displays the estimated boreal owl habitat capability from these areas by the 21 Ecological Provinces.

Each of the alternatives increases the habitat capability for boreal owls by varying amounts above the levels described here.

Table 3-204

Estimated Boreal Owl habitat capability (# of pairs) within Wilderness/Monument areas, Legislated LUD II areas, and other natural setting LUD's common to all alternatives

Area	Productive Old Growth Acres[3] Strata B, C, D	Strata A	Unproductive Old Growth Acres	Estimated Capability # of Pairs[4]	Distance to Next Area
Wilderness/Monuments					
C11	10,696	23,183	28,969	0-9	Adjacent to C11a
C11a	30,455	12,995	8,789	33	15 Miles to C22
C16	4,962	10,021	19,877	0-4	5 Miles to C02 & C02a
C22	318,768	225,124	197,589	384	10 Miles to C37a
C23	4,998	6,599	7,943	0	5 Miles to C26
C38	15,724	44,931	105,803	0-16	Adjacent to C26 & C35
C49	17,456	47,510	80,576	0-16	15 Miles to C22
C52 [1]	10,765	13,418	5,964	0-9	5 Miles to C56
S06	36,649	10,283	5,629	43	15 Mi. to C49; 10 Mi. to S12
S06a	23,238	14,436	10,497	24	Adjacent to S06; 15 Mi. to K03a
S15	11,717	10,999	20,099	12	15 Mi. to S34; 10 MI. to S12
S24	15,541	20,231	30,120	18	15 Mi. to S32
S34	38,113	32,107	34,323	44	10 Mi. to S15; Adjacent to S28
K12	11,373	10,658	8,762	0-9	25 Mi. to S06a; 17 Mi. to K03a
K16	16,876	4,319	11,396	20	25 Mi. to K13a & K27a
K27	12,672	19,482	47,038	15	Adjacent to K27a; 25 Mi. to K41
K43 [2]	249,598	329,283	645,886	172-262	8 Mi. to K33; Adjacent to K31
Legislated LUD II's					
C02a	5,142	7,826	5,045	4	Adjacent to C02 & C04 & C05
C26	22,135	15,913	13,931	24	Adjacent to C35; 10 Mi. to C38
C35	14,609	26,793	24,949	16	Adjacent to C26 & C38
C36	10,275	9,795	8,755	9	5 Mi. to C35 & C37a
C37a	2,398	1,819	659	3	5 Mi. to C36; 10 Mi. to C22
C58[1]	10,693	5,826	12,535	0-9	Adjacent to C52 & C56
S09a	2,275	499	319	0	7 Mi. to S06
S32	7,583	8,663	16,506	9	15 Mi. to S24; Adjacent to K31
K02	2,406	2,068	4,519	3	6 MI. to K03a
K03a	21,057	12,446	15,438	24	6 Mi. to K02; 15 Mi. to S06a
K13a	19,210	26,175	25,981	24	25 Mi. to K16
K27a	10,361	2,460	5,061	9	25 Mi. to K16; Adjacent to K27
K33	13,136	4,619	10,097	16	8 Mi. to K43; 20 Mi. to K31/K41
Natural Setting					
C01	8,980	17,202	26,128	0-9	Adjacent to C02; 5 Mi. to C16
C02	5,487	11,272	10,570	0-4	Adjacent to C02; 5 Mi. to C16
C04	619	2,038	2,399	0	Adjacent to C05 & C09
C05	1,358	3,975	2,677	0	Adjacent to C04; 10 Mi. to C02a
C08	2,238	9,638	10,563	0	Adjacent to C09; 10 Mi. to C22
C09	5,156	10,654	7,754	0-4	10 Mi. to C22; Adjacent to C08
C42	2,005	2,486	2,606	0	15 Mi. to C47; 20 Mi. to C36
C47	4,060	7,419	12,377	0-4	6 Mi. to C22; 15 Mi. to C42
C56[1]	4,504	2,022	13,672	0-4	Adjacent to C58 & C52
C59[1]	223	423	589	0	Adjacent to C58 & C52
C60[1]	350	0	0	0	Adjacent to C58; Glacier Bay NP
C61[1]	1,397	320	2,739	0	Adjacent to C52 & C56

Table 3-204 (continued)

Area	Productive Old Growth Acres[3] Strata B, C, D	Strata A	Unproductive Old Growth Acres	Estimated Capability # of Pairs[4]	Distance to Next Area
S03	0	0	0	0	Adjacent to C11 & S34
S28	7,164	21,675	42,628	0-4	Adjacent to S34; 10 Mi. to K31
K31	26,923	26,225	41,645	24	Adjacent to S32 & K43
K41	8,300	9,848	17,668	9	20 Mi. to K33; 25 Mi. to K27
K42	3,075	4,263	34,707	0-4	20 Mi. to K41
			Total Forestwide	**947-1,147**	

Source: Revision data base, Q200ELUD, May 1991.

[1] These acres represent the oldest tree stands in these areas, however, they may not contain all of the characteristics associated with old growth stands in the other provinces.

[2] The area is all of Misty Fiords National Monument/Wilderness; to estimate boreal owl habitat capability this area was analyzed in smaller geographic units - only the summary is presented here.

[3] Strata B, C, D represent old growth acres with greater than 20,000 board feet per acre timber volume; Strata A represents old growth acres with 8,000 to 20,000 board feet per acre timber volume. Unproductive old growth is acres of old growth with less than 8,000 board feet per acre.

[4] Areas which do not meet the landscape requirements as recommended by the viability committee; in these areas, a range of capabilities from zero to the upper limit is shown.

Table 3-205

Estimated Boreal Owl habitat capability (# of pairs) by 21 Ecological Provinces

Province	Estimated # of Pairs	Province	Estimated # of Pairs
1	0-13	11	67
2	0-9	12	44
3	52	13	18
4	0-16	14	47
5	0-4	15	119
6	0-16	16	9-33
7	384	17	0
8	4-21	18	24
9	33-46	19	41-85
10	12	20	46-120
		21	0-4

Discussion of Some of the Viability Recommendations

Two task groups involving biologists from the Forest Service, Alaska Department of Fish and Game, and U. S. Fish and Wildlife Service, provided the interdisciplinary planning team with recommendations for viable populations and their distribution during the planning process. Not all of the recommendations from the viability task groups have been accepted or used at this time in the Tongass Forest Plan Revision. This section discusses the reasoning for incorporating some but not all recommendations.

1988 Viability Task Group Recommendations. In 1988, for five of the MIS (Sitka black-tailed deer, marten, red-breasted sapsucker, hairy woodpecker, brown creeper), the task group recommended maintaining habitat capability to support a recommended number of reproductively active individuals in each of ADF&G's WAA's. The number of individuals recommended were 500 in each WAA for deer and 50 in each WAA for the other four species. There were two concerns for this recommendation:

1. The WAA's have a great variation in size and in natural habitat features. Using the MIS habitat capability models developed for the Forest Plan Revision, some of the WAA's could not naturally support the number of individuals recommended by the Task Group. For deer and marten, trapping and hunting seasons indicated sustainable harvests coming from many of these same WAA's. A couple of examples will illustrate: 1) WAA's 2620 and 2621 are islands north of Juneau. The combined deer habitat capability for these WAA's is 244 animals (78 for WAA 2620 and 155 for WAA 2621). The combined annual deer harvests from these two WAA's have ranged from 50 to 155 animals from 1980 to 1989. Although many factors (such as lighter than normal winters, immigration from adjacent areas, etc.) may be operating in these WAA's, it is evident that a set requirement for maintaining a habitat capability of 500 deer in each WAA is not naturally possible nor is it necessary for deer population viability. 2) On Baranof Island, marten habitat capability is estimated to be 26 and 33 in WAA's 3312 and 3732, respectively. Trapping records for the 1984-85 season to the 1987-88 season indicate an average annual harvest of 5 marten from WAA 3312 and 20 marten from WAA 3732. It is evident that a set requirement for maintaining a habitat capability of 50 marten in each WAA is not naturally possible nor is it necessary for marten population viability.

2. The second concern is with the definition of well distributed inferred by the viability task group. Defining well-distributed as a viable number of reproductive pairs within the geographic area delineated by each of ADF&G's 191 Wildlife Analysis Areas is not required by the NFMA nor its implementing regulations.

The Viability Task Group recommendations were not adopted because the numbers recommended are unattainable even in a natural setting and are likely more conservative than necessary to ensure viability.

1990/1991 Viability Task Group Recommendations. This task group provided the interdisciplinary team with several recommendations for maintaining viable populations. The interdisciplinary team review of their major recommendations follows.

1. This task group recommended maintaining large blocks of old-growth habitats distributed among 21 Ecological Provinces, and in some cases the provinces were divided into sub-provinces. Each province or sub-province was to have one large block of preserved old-growth habitat which contained at least 20,000 acres of old growth with over 20 MBF per acre, and these 20,000 acres were to comprise from 25 to 50 percent of the landscape in the block in order to provide habitat suitable for goshawks, boreal owls, and marten. It was estimated that such a block would provide habitat for 25 female marten during winters of poor prey, 8 pairs of goshawks, and 24 pairs of boreal owls.

   After review of the recommendations, this proposal was not adopted at this time because there are areas of the Forest which do not naturally meet this requirement, such as: Yakutat, the mainland from Skagway to the Taku River, West Chichagof/Yakobi Wilderness, the southern two-thirds of Baranof Island, Kruzof Island, most of Kupreanof and Mitkof Islands, and much of Misty Fiords National Monument/Wilderness. In these areas, it may be possible to identify small individual sites which meet the viability

committee's requirements, but there are no large landscape type areas. In some of these areas, the amount of 20 MBF old growth acres may be low, but there is considerable old-growth habitat with less than 20 MBF per acre. A review of marten trapping records indicates that marten populations in these areas are capable of sustaining themselves without the task group's recommended habitat requirements.

There is no research data from Southeast Alaska supporting the recommendation that large amounts of old growth with more than 20 MBF per acre are required to maintain viable populations of these three species. Goshawks have been observed at Yakutat, Skagway, Juneau, and Mitkof Island. Boreal Owl surveys conducted in 1986-1988 documented boreal owl responses in the Juneau Area and Mitkof Island. These areas do not have large blocks of contiguous old growth greater than 20 MBF per acre.

At the present time, we have very little information about the distribution, abundance and habitat requirements for goshawks in Southeast Alaska. A research study on the birds of Prince of Wales Island conducted during 1978 and 1979 did not document any goshawks (Planning Records, August 1990); however, there have been other recorded sightings of goshawks on Prince of Wales Island (Planning Records, August 1990).

A historical review of recorded bird observations in Southeast Alaska indicated that goshawks were extremely rare, with only a few sightings documented (Planning Records, 1991). A compilation of goshawk sightings was done in August 1990 (Planning Records, Aug. 1990), and a review of these recorded observations documents the presence of goshawks in the following general habitats: old growth, riparian, estuary, flying over clearcut into unharvested riparian zone, islands of various sizes, preying on chickens, eating a duck, willow flats, muskeg, Juneau, University of Alaska Southeast Campus at Ketchikan, and at the tree nursery in Petersburg.

A review of goshawk literature indicates wide variation in home range sizes from 500 acres to over 6,000 acres. The literature does not describe the vegetational makeup of these home ranges. Nest stands are consistently described as dense canopy, greater percent of forested land, greater tree density and greater basal area than compared to the immediately surrounding area, but no descriptions were found for the entire home ranges. Saunders (1982) documented goshawks nests in pole stands of timber.

2. The viability committee recommended no vegetational disturbance within a goshawk's home range (about 6,000 acres) if a nesting territory is found during project planning, or a 1,600 acre buffer (no vegetational disturbance) around a nesting territory if the territory is found after a Decision Notice. There has been no rationale to date on why 1,600 acres would be adequate in one instance but 6,000 acres is needed in another.

   A review of food habits for goshawks indicates prey species from a variety of habitats, not just old growth habitats. Studies on Queen Charlotte goshawk food habits documented crows, Stellar's jays, and varied thrushes as the dominant food items (Beebe, 1974).

   The viability committee's recommendation was not adopted at this time. Further study is needed to document use patterns. The Forest Service and ADF&G are currently cooperating in a Forest Raptor Study to begin collecting population and habitat use information for goshawks, boreal owls and other forest raptors.

3. The viability committee recommended that each of the 21 Ecological Provinces be capable of supporting 500 marten during winters of average prey, considering habitat fragmentation and the effects of roads. Using the current marten model, the following

provinces did not provide for that habitat capability even in 1954 “pristine conditions:” 1, 2, 4, 5, 8, 16, 17, and 21. Province 21 is the Icefields Province and is not expected to have a very high marten habitat capability. In the other seven provinces, there has been and currently is a marten trapping season with no limit on the number of trappers or the number of marten trapped. Marten trapping data is displayed in Table 3-194 and Table 3-195.

Because of observations at Glacier Bay and Yakutat in various vegetational successional stages, it seems unlikely that there are any dispersal limitations for marten. In addition, indications are that marten populations are healthy in all provinces that support marten.

For marten, the viability committee recommended forested corridors (defined as old growth or young sawtimber second growth of at least 8 MBF per acre) at least 1200 feet wide if the travel distance is greater than 600 feet. If these conditions are necessary, it is impossible to explain the presence of marten in Glacier Bay National Park and at Yakutat because no old growth exists in either location. Marten apparently dispersed naturally into these areas and have healthy populations. This proposal was therefore rejected.

The National Park Service, Glacier Bay National Park, has documented that, “Pine martens are evidently common and are seen regularly not only in the older forests near Bartlett Cove, but in a variety of habitat types throughout the park. They were recorded at every survey location during the last winter wildlife survey.” (letter dated August 10, 1989).

In conclusion: a) there are several instances where the marten habitat capability model underestimates the apparent historic populations of marten, b) apparently maintaining 500 marten in each province is not necessary to sustain long-term population viability, and c) If 500 marten were necessary for population viability, then at least eight ecological provinces should not be managed for marten because they have never been able to support 500 animals and trapping should be closed in those eight provinces. This proposal was therefore rejected.

4. For wolves, the viability committee recommended that deer habitat capability of individual WAA’s should be greater than 10 deer per square mile in order to provide a sufficient prey base to support viable populations of wolves. The viability committee did not define the land area over which to calculate the wolf density. Using the land area below 1500 feet elevation, which equates to the land area comprising all of the deer winter range, deer densities with 1954 habitat conditions were evaluated.

   Within occupied wolf habitat on the Forest, a total of 49 WAA’s have deer habitat capabilities less than 10 deer per square mile. All of these WAA’s are on the mainland. Wolf harvest records from 1980 through 1987 indicated 137 wolves harvested from these WAA’s. Some of these WAA’s have moose and mountain goat populations which would provide some prey for wolves. However, according to the wolf habitat capability model, the entire Forest mountain goat population would only provide for about 10 wolves. And when one considers that the mountain goat population is scattered from Yakutat to Misty Fiords, it is doubtful that mountain goats sustain many wolves at all.

   Using the wolf habitat capability model, the moose population on the Forest is estimated to provide for about 14 wolves. Wolf studies in Southeast Alaska indicate that when ungulate prey is scarce, wolves use alternate prey species such as beaver (Smith, et al., 1986(b) and even salmon (Young and Goldman, 1944, p. 248). With alternate prey species including beaver, moose and especially salmon, there is no conclusive evidence at

this time that there is an insufficient prey base for a viable population of wolves. Therefore, the proposal for an objective of 10 deer per square mile for wolves was rejected.

5. The viability Committee recommended Forest-wide application of the Beach Fringe/ Estuary Land Use Designation to ensure that Forest management activities do not disrupt the distribution of the species. Although not specifically stated, the assumption of the viability committee focuses on the need for old-growth forests along the beach and estuary fringes. Thirty percent of the beach and estuary fringe on the Forest was not in productive old-growth forest in 1954, yet river otters were distributed forest wide. Home (1982) did a study of river otters in Glacier Bay National Park. One of his study sites was Goose Cove. Goose Cove was covered by 365 meters of glacial ice in 1899. By 1925, the glacier had begun to recede. By 1927, the area of Goose Cove was completely ice free. In 1965, the Park Service established a Ranger Station in Goose Cove, and park Rangers documented otters were resident in the cove at that time. In 1965, the vegetation in Goose Cove consisted only of Dryas and scrub alder, less than 12 cm high. Park Ranger logs from 1965 to the time of Home's study indicate that the activities, sites, and ranges of the otters have not changed. In reviewing Home's data on the amount of area exploited by otters, there is little evidence that habitat capability is related to the adjacent upland vegetation. Therefore, the recommendation that the Beach Fringe and Estuary LUD apply everywhere was not adopted.

6. The viability committee recommended that active nest sites of great blue herons be protected with a 1/4 mile buffer, allowing no development activities to occur within the buffer. Protection of active nests is included in the proposed standard and guidelines but not with a 1/4 mile buffer. Some literature indicated that smaller buffers could be acceptable, while some situations may call for larger buffers (USFWS, 1985). There is no conclusive evidence that great blue heron require 1/4 mile buffers. Specific standards and guidelines have been provided to protect the integrity of active rookeries.

7. For the northern hawk owl, the viability committee recommended implementing a forest-wide snag management policy in association with timber harvest which ensures the continued presence of snags in clearcuts and second-growth forests. The Forest-wide standards and guidelines (Chapter 4, Porposed Revised Forest Plan) do not include a requirement for the continued presence of snags in all clearcuts and second-growth forests because of likely impracticality and no evidence that the northern hawk owl needs that level of habitat. Analysis for two MIS species (hairy woodpecker and red-breasted sapsucker) which require snag habitat illustrate that maintaining snags in clearcuts and second growth is not needed in every instance to maintain viable populations well distributed throughout the Forest. The MIS section provides more information on hairy woodpecker and red-breasted sapsucker habitat. A Forest-wide standard and guideline for maintaining snags on the Forest is provided in Chapter 4 of the Proposed Revised Forest Plan.

Direct, Indirect and Cumulative Effects

Introduction

All of the effects analysis and tables display estimated potential future changes in habitat capability on National Forest lands. Contribution of habitat from private lands is discussed in a separate subsection titled "Wildlife Habitats on Adjacent Private Lands within the Planning Area.".

Sitka Black-tailed Deer

Table 3-206 displays estimated changes in Sitka black-tailed deer winter habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Sitka Black-tailed Deer in Southeast Alaska: Winter Habitat," (Suring, et al., 1988, with 1991 revisions) was used. The estimated winter habitat capability for deer in 1954 was 287,128 deer. On a Forest-wide basis, the 1990 winter habitat capability for deer was 93 percent of 1954. In 1990 the Chatham Area was 95 percent of 1954 habitat capability, the Stikine Area was 94 percent, and the Ketchikan Area was 91 percent.

As described by Suring et al. (1988), there is an estimated relationship between the amount of timber harvesting in old-growth forests and reductions in winter habitat capability. Alternative D with the highest allowable sale quantity has the highest potential for Forest-wide reduction in habitat capability, while Alternative A, with the lowest allowable sale quantity, has the lowest potential for Forest-wide reduction in winter habitat capability. On a Forest-wide basis, at the end of the first decade, Alternatives A and B habitat capability is 90 percent of 1954, Alternative C is 88 percent of 1954, Alternative D is 87 percent of 1954, and Alternative P is 89 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A habitat capability is 76 percent of 1954, Alternative B is 74 percent of 1954, Alternative C is 66 percent of 1954, Alternative D is 63 percent of 1954, and Alternative P is 68 percent of 1954.

Table 3-206

Estimated changes in Sitka black-tailed Deer winter habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative, for Decades 1, 2, 5, and 15																				
		1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	94,492	95	93	93	90	87	92	91	88	85	88	86	83	79	89	87	83	78	88	87	84	80
Stikine	68,490	94	91	88	81	73	91	88	79	69	89	86	76	64	88	84	72	58	90	87	78	68
Ketchikan	124,146	91	88	85	77	69	88	85	77	67	86	82	70	57	86	81	68	55	88	84	72	60
Total	**287,128**	**93**	**90**	**88**	**83**	**76**	**90**	**88**	**81**	**74**	**88**	**84**	**75**	**66**	**87**	**84**	**74**	**63**	**89**	**85**	**77**	**68**

Source: Revision data base QODHE ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988 (with 1991 revisions).

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-207. About 161 WAA's currently support deer populations. In 1990, 127 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 27 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, and 7 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternative D has the highest number of WAA's with habitat capabilities below 50 percent at the year 2154 (150 years into the future).

Table 3-207

Summary of changes in Deer habitat capabilities for ADF&G's Wildlife Analysis Areas

Percent of 1954	No. of WAA's for 1990 and Decade 15 for Each Alt.					
Habitat Capability	1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	127	77	66	61	58	64
75-89 Percent	27	29	26	10	14	11
50-74 Percent	7	39	46	49	41	50
Less than 50 Percent	0	16	23	41	48	36

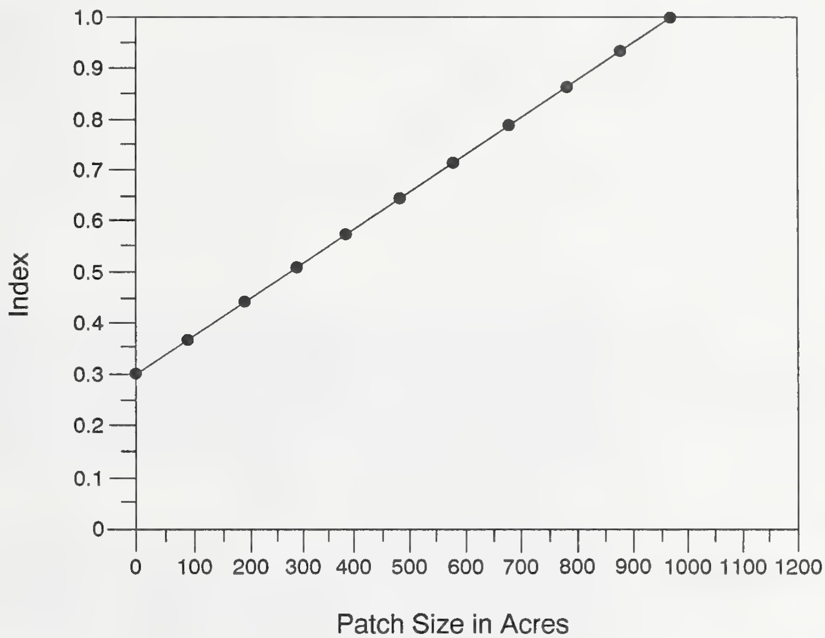
Source: Revision data base QODHE ALL, June 1991; FORPLAN analysis, June 1991; Suring et al., 1988 (with 1991 revisions).

The estimated effects in Tables 3-206 and 3-207 and Appendix L do not include an evaluation of the effects of old-growth patch size as described by Suring, et al. (1988) (Figure 3-49). With the Revision data base, it was not possible to identify existing patch sizes for analysis, nor is it feasible to predict future patch sizes which would result from project work. The old-growth patch size relationship is poorly understood and not well developed or documented for Southeast Alaska, and is currently thought to be applicable only in areas of the Forest with wolves (Suring, et al., 1988; Analysis of the Management Situation, Tongass National Forest, 1990).

Currently the U. S. Forest Service is cooperating with the Alaska Department of Fish and Game and University of Alaska in a study to evaluate the effects of patch size on deer in Southeast Alaska. To examine the effects of patch size, 103 islands of varying size and remoteness have been sampled for deer densities. A progress report on this research indicates that deer densities appear unrelated to island size, overstory characteristics, or understory composition and abundance (Kirchhoff, 1990), hence, no clear patch size relationship is evident to date. This research is continuing.

Figure 3-49

ESTIMATED EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT SITKA BLACK-TAILED DEER ON LARGER ISLANDS AND THE MAINLAND WITH RESIDENT WOLF POPULATIONS



Source: Suring et al. 1988; Modeling Task Force letter October 12, 1989

The alteration of natural patch sizes by management activities is primarily associated with areas of land which have been allocated to LUD's that allow timber harvesting. Natural old-growth patch sizes would be maintained within those areas of land allocated to LUD's with no scheduled timber harvest. Table 3-208 displays how land below 1500 feet elevation, within occupied deer habitat, is allocated among four LUD groupings for each of the alternatives. Old-growth patch sizes within the intensive and moderate development LUD groupings would likely be fragmented to some extent by timber harvesting. Within the areas of land allocated to timber management, there are many different patterns and options for laying out timber harvest units. Forest-wide Standards & Guidelines for Sitka black-tailed deer and biological diversity direct projects to maintain as large old-growth patch sizes as is practicable (see Chapter 4, Proposed Revised Forest Plan).

Table 3-208

Acres of land below 1500 feet elevation, within occupied deer habitat, allocated to four LUD groupings

Alt.	Intensive Development	Moderate Development	Natural Setting	Wilderness/ Monument
A	746,488	1,658,118	3,148,231	2,183,470
B	1,495,061	1,398,569	2,659,207	2,183,470
C	2,331,502	1,619,673	1,601,662	2,183,470
D	3,077,719	937,349	1,537,769	2,183,470
P	1,846,084	1,769,591	1,937,162	2,183,470

Source: Revision data base, Q260ODHE

Mountain Goat

Table 3-209 displays estimated changes in mountain goat winter habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Mountain Goats in Southeast Alaska: Winter Habitat," (Suring, et al., 1988) was used. The estimated winter habitat capability for mountain goats in 1954 was 8,540 goats. On a Forest-wide basis, the 1990 winter habitat capability was 100 percent of 1954 levels (no measurable reduction).

Suring, et al. (1988) identifies productive old growth within 2,600 feet of cliffs within areas occupied by mountain goats as the most important winter habitat. Very little of this habitat is within LUD's which allow timber harvesting, or if it is within LUD's which allow timber harvesting, little of the old growth is considered suitable for timber management. As such, all alternatives are expected to maintain 98 to 99 percent of 1954 habitat capability.

Table 3-209

Estimated changes in Mountain Goat winter habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15.																				
		1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	3,772	100	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Stikine	1,446	100	99	99	99	99	99	99	99	99	99	99	99	99	100	99	98	98	100	100	99	98
Ketchikan	3,322	100	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	98	99	99	99	98
Total	**8,540**	**100**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**99**	**98**	**99**	**99**	**99**	**98**

Source: Revision data base, QORAM ALL, June 1991; FORPLAN Analysis, June 1991; Suring et al. 1988.

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-210. About

75 WAA's have mountain goat populations. In 1990, all of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternatives C, D, and P have the highest number of WAA's (one to two) with habitat capabilities below 75 percent.

Table 3-210

Summary of changes in Mountain Goat habitat capabilities for ADF&G's Wildlife Analysis Areas.

Percent of 1954 Habitat Capability	No. of WAA's for 1990 and Decade 15 for Each Alt. 1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	75	71	70	66	69	69
75-89 Percent	0	3	4	6	4	4
50-74 Percent	0	1	1	1	2	0
Less than 50 Percent	0	0	0	1	0	1

Source: Revision data base QORAM ALL, June 1991; FORPLAN analysis, June 1991; Suring et al., 1988.

Suring et al. (1988) estimated the effects of human development and access on winter habitats and populations (Table 3-198). They estimate that habitat capability is reduced with increasing human access and development. Reductions range from 10 to 40 percent depending on the type of development and the amount of human access.

Table 3-211

Effects of human disturbance on the habitat capability for Mountain Goats in Southeast Alaska

Type of Human Access or Development	Habitat Capability Reduction (in percent)
FS Cabin/Developed Campground/Seasonal Camp within one mile of occupied habitat	10
Permanent Camp Site/Residence/Float Camp	
within one mile of occupied habitat	40
one to five miles from occupied habitat	10
Access Point (airstrip, dock, floatplane lake) within one mile of occupied habitat	10
Road Accessible to Vehicles within two miles of occupied habitat	20
Transportation Link (ferry access/town) within two miles of occupied habitat	40
Trails or Road Access Limited to Hiking within two miles of occupied habitat	10

Source: Suring et al. 1988

Road access and other human disturbances are more likely to occur within LUD's which are more permissive to development activities (Table 3-211). Table 3-212 illustrates how the areas within occupied mountain goat habitat are allocated to four LUD groupings. In all alternatives, most of the mountain goat habitat is allocated to the natural setting or Wilderness/Monument LUD groups.

Table 3-212

Acres of land within occupied Mountain Goat habitat, allocated to four LUD groupings

Alt.	Intensive Development	Moderate Development	Natural Setting	Wilderness/ Monument
A	136,975	874,151	4,124,096	3,902,351
B	389,127	790,355	3,955,740	3,902,351
C	925,040	1,121,803	3,088,379	3,902,351
D	1,232,970	499,695	3,402,556	3,902,351
P	651,774	1,127,987	3,355,461	3,902,351

Source: Revision data base, Q260 ORAM, June 1991.

Brown Bear

The environmental consequences for brown bear are discussed in two parts: the estimated effects due to vegetational changes, followed b, the estimated effects due to potential human/ bear conflicts, will be discussed.

Table 3-213 displays estimated changes in brown bear late summer habitat capability due to vegetational changes for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Brown Bear in Southeast Alaska," (Schoen et al. 1989, with 1991 revisions) was used. The estimated late summer habitat capability for brown bear in 1954 was 6,227 bears. On a Forest-wide basis, the 1990 late summer habitat capability for brown bear was 98 percent of 1954 (a 2 percent reduction). In 1990 the Chatham Area was 98 percent of 1954 habitat capability, the Stikine Area was 99 percent, and the Ketchikan Area was 100 percent.

As described by Schoen, et al. (1989), there is an estimated relationship between the amount of timber harvesting in old-growth forests and reductions in late summer habitat capability. Alternatives C and D, with the highest allowable sale quantities, have the highest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential for Forest-wide reduction in habitat capability. On a Forest-wide basis, at the end of the first decade, Alternative A's habitat capability is 98 percent of 1954, Alternative B is 97 percent of 1954, and Alternatives C, D, and P habitat capabilities are 96 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A habitat capability is 95 percent of 1954, Alternative B is 94 percent of 1954, Alternative C is 91 percent of 1954, Alternative D is 91 percent of 1954, and Alternative P is 92 percent of 1954.

Table 3-213

Estimated changes in Brown Bear late summer habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15. 1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	5,103	98	97	97	96	94	97	96	95	93	95	94	92	91	95	94	92	90	95	94	92	91
Stikine	340	99	98	97	95	95	98	97	96	94	98	98	95	92	98	98	96	93	98	98	96	93
Ketchikan	784	100	100	100	100	99	100	100	100	98	100	100	99	97	100	100	100	98	100	100	99	97
Total	**6,227**	**98**	**98**	**97**	**96**	**95**	**97**	**97**	**96**	**94**	**96**	**95**	**93**	**91**	**96**	**95**	**93**	**91**	**96**	**95**	**94**	**92**

Source: Revision data base, QURAR, June 1991; FORPLAN Analysis June 1991; Schoen et al. 1989

Natural resource management and development, which increases human activity in brown bear habitat, may result in increased direct human-induced mortality of bears. Schoen, et al. (1989) estimated the effects of human developments and activity on habitats and populations of brown bear (Table 3-214). As access and development increases human activity into occupied brown bear habitat, there is potential for the quality and capability of the habitat to decline. Schoen's estimates (Table 3-214) are based on best professional judgement only. No statistical inventory or analysis has been performed.

Table 3-214

Effects of development and human activity on the habitat capability for Brown Bear in Southeast Alaska

Type of Development or Activity	Habitat CapabilityReduction (in percent) within Two Influence Zones: less than one mile	one to five miles
Communities:		
Greater than 1,000 people	100	70
501-1,000 people	100	50
11-500 people	70	40
Less than 10 people	50	20
Landfill - no effective incineration	100	50
F. S. Cabin/Developed Campground	20	0
Permanent Camp Site	80	50
Temporary Camp Site	50	20
Access Point (airstrip, dock, floatplane lake)	20	0
Mainline Roads with Ferry Access or Towns	60	30
Secondary Roads with Vehicle Access	40	10
Roads Closed Administratively	20	0
Roads Closed Permanently	10	0

Source: Schoen, et al., 1989.

Many of the developments and associated potential reductions in habitat capability listed in Table 3-214 would be associated with those areas allocated to management prescriptions which allow development activities. Table 3-215 displays the percent of brown bear habitat on the Forest allocated to four LUD groupings for each alternative. Intensive and moderate development within brown bear habitat ranges from 12 percent of the habitat in Alternative A to 23 percent of the habitat in Alternative C.

Table 3-215

Acres of land within occupied Brown Bear habitat, allocated to four LUD groupings

Alt.	Intensive Development	Moderate Development	Natural Setting	Wilderness/ Monument
A	144,168	1,131,080	4,696,596	5,079,460
B	479,808	1,127,307	4,364,729	5,079,460
C	1,127,276	1,470,388	3,374,180	5,079,460
D	1,533,295	816,803	3,621,746	5,079,460
P	964,795	1,379,994	3,627,055	5,079,460

Source: Revision data base, Q260URAR, June 1991.

Table 3-216 displays potential changes in brown bear habitat capability due to vegetative conditions plus increased human access and development for the following developments or activities: 1) communities; 2) cabins and developed campgrounds; 3) mainline roads with ferry access or towns; and 4) secondary roads with vehicle access. In calculating the road access effects, the conservative assumption was that all of the National Forest lands within the intensive and moderate prescription groupings would have road access by the year 2150 (i.e., all of the acres would have a road within 1 mile by the year 2150), and none of the roads would be closed. This is considered a maximum potential effects analysis as far as roads are concerned.

Although not directly accounted for, permanent camp sites and temporary camp sites would primarily be associated with the intensive and moderate prescription groupings and most of their effects would also be accounted for with the assumption used. Information on access points such as floatplane lakes, and trails were not available and are not included in the estimated changes in Table 3-216.

Table 3-216

Estimated changes in Brown Bear late summer habitat capability due to changes in vegetative conditions, plus effects of towns, cabins, campgrounds, and roads, compared to 1954

	Percent of 1954 Vegetative Habitat Capability						
Area	**1954**	**1990**	**A-15**	**B-15**	**C-15**	**D-15**	**P-15**
Chatham	98	93	86	83	78	77	79
Stikine	100	97	89	87	79	85	82
Ketchikan	99	98	96	96	92	94	92
Total	**98**	**94**	**88**	**85**	**80**	**79**	**81**

Source: Revision data base, QURAR ALL, June 1991; FORPLAN analysis, June 1991; Schoen, et al., 1989.

On a Forest-wide basis, estimated brown bear habitat capability resulting from vegetative conditions plus influences of towns, cabins, campgrounds, and potential maximum effects of road access was 98 percent in 1954 compared to 1954 vegetative habitat capability; 94 percent in 1990, and by the 15th decade would be about 88 percent for Alternative A, 85 percent for Alternative B, 80 percent for Alternative C, 79 percent for Alternative D, and 81 percent for Alternative P.

Appendix L contains habitat capability estimates (due to vegetative conditions, towns, cabins, campgrounds, and potential maximum effects of road access) for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15.

A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-217. About 116 WAA's have brown bear populations. In 1990, 95 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 15 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, and 6 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternative C has the highest number of WAA's with habitat capabilities below 50 percent.

Table 3-217

Summary of changes in Brown Bear habitat capabilities for ADF&G's Wildlife Analysis Areas

Percent of 1954	No. of WAA's for 1990 and Decade 15 for Each Alt.					
Habitat Capability	**1990**	**A-15**	**B-15**	**C-15**	**D-15**	**P-15**
90-100 Percent	95	76	69	62	60	65
75-89 Percent	15	19	16	12	16	12
50-74 Percent	6	15	23	17	22	20
Less than 50 Percent	0	6	8	25	18	19

Source: Revision data base QURAR ALL, June 1991; FORPLAN analysis, June 1991; Schoen, et al., 1989.

The analysis presented above does not directly include the effects of open pit garbage dumps/landfills on non-National Forest lands. Some existing dumps/landfills are located on non-National Forest lands and are associated with communities. The effects of these dumps/landfills are indirectly accounted for, in part, with the effects of towns.

Current USDA Forest Service direction is to phase out all existing open pit garbage dumps/landfills and authorize no new ones on National Forest lands. The USDA Forest Service has been working with Alaska State agencies to phase out or require measures to reduce attracting bears at existing open pit garbage dumps/landfills.

On the Chatham Area, all of the timber operators on the area are incinerating their garbage and disposing of the ashes in a landfill in accordance with respective State Department of Environmental Conservation permits. Green's Creek mine is doing likewise. There are no open pit garbage dumps/landfills under special use permit on the Chatham Area.

On the Ketchikan Area, no open pit garbage dumps/landfills currently exist on the Tongass within brown bear habitat.

On the Stikine Area, several open pit garbage dumps/landfills may exist at logging camps and cabins within brown bear habitat. However, some of the cabins on the Stikine area have had small incinerators installed to dispose of burnable garbage.

Adverse effects on bear habitat capability from open pit garbage dumps/landfills is likely less today than a few years ago due to efforts to close them and the requirements for incineration.

The adverse effects from development and human access can be reduced with appropriate management activities, such as closing roads, closing open pit dumps, requiring incineration of burnable garbage, "pack-it-in, pack-it-out" requirements for recreational users, etc. Currently, 42 percent of the roads in brown bear habitat on the Forest are closed. Direction has been developed to implement a Forest-wide program with necessary regulations to reduce or eliminate habituation of bears to human foods/garbage and reduce chances of human/bear incidents. Specific standards and guidelines can be found in Chapter 4 of the Proposed Revised Forest Plan and were summarized under the Management Indicator Species subheading earlier in this section.

Black Bear

The environmental consequences for black bear are discussed in two parts: first the estimated effects due to vegetational changes will be discussed; second, the estimated effects due to potential human/bear conflicts will be discussed.

Table 3-218 displays estimated changes in black bear habitat capability due to vegetational changes for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Black Bear in Southeast Alaska," (Suring, et al., 1988) was used. The estimated habitat capability for black bear in 1954 was 14,567 bears. On a Forest-wide basis, the 1990 habitat capability for black bear was 98 percent of 1954 (a 2 percent reduction). In 1990 the Chatham Area was 100 percent of 1954 habitat capability, the Stikine Area was 99 percent, and the Ketchikan Area was 97 percent.

As described by Suring, et al. (1988), there is an estimated relationship between the amount of timber harvesting in old-growth forests and reductions in habitat capability. Alternatives C and D with the highest allowable sale quantities have the highest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential for Forest-wide reduction in habitat capability. On a Forest-wide basis, at the end of the first decade, Alternatives A, B, D, and P habitat capabilities are 97 percent of

1954, and Alternative C is 96 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A habitat capability is 87 percent of 1954, Alternative B is 86 percent of 1954, Alternative C is 81 percent of 1954, Alternative D is 81 percent of 1954, and Alternative P is 82 percent of 1954.

Table 3-218

Estimated changes in Black Bear habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15. 1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	2,448	100	98	98	96	94	97	97	95	92	94	93	91	87	96	96	93	89	94	93	90	87
Stikine	4,449	99	98	97	92	85	98	97	91	83	97	96	89	79	98	95	88	77	98	96	90	80
Ketchikan	7,670	97	97	96	91	86	97	96	91	85	97	95	88	80	96	94	88	80	97	95	89	81
Total	**14,567**	**98**	**97**	**96**	**92**	**87**	**97**	**96**	**92**	**86**	**96**	**95**	**89**	**81**	**97**	**95**	**89**	**81**	**97**	**95**	**89**	**82**

Source: Revision data base, QURAM, June 1991; FORPLAN Analysis, June 1991; Suring, et al., 1988.

Natural resource management and development, which increases human activity in black bear habitat, may result in increased direct human-induced mortality of bears. Suring, et al. (1988) estimated the effects of human developments and activity on habitats and populations of black bear (Table 3-219). As access and development increases human activity into occupied black bear habitat, there is potential for the quality and capability of the habitat to decline.

Table 3-219

Effects of development and human activity on the habitat capability for Black Bear in Southeast Alaska

Type of Development or Activity	Habitat Capability Reduction (in percent) within Zones of Influence: Less than one mile	One to five miles
Open-pit Garbage Dump	90	50
F. S. Cabin/Developed Campground/Seasonal Camp	10	0
Permanent Camp Site/Residence/Float Camp	40	10
Access Point (airstrip, dock, floatplane lake)	10	0
Road Accessible to Vehicles		20 (within 2 miles)
Mainline Roads with Ferry Access or Towns		20 (within 2 miles)
Accessible Road within .5 mile of Anadromous Streams	20 (within 0.5 miles)	
Trails or Road Access Limited to Hiking		10 (within 2 miles)
Road Limited to Hiking/ORV's (within .5 mile of Anadromous Streams	10 (within 1 mile)	

Source: Suring, et al., 1988.

Many of the developments and associated potential reductions in habitat capability listed in Table 3-219 would be associated with those areas allocated to management prescriptions which allow development activities. Table 3-220 displays the percent of black bear habitat on the Forest allocated to four LUD groupings for each alternative. Intensive and moderate development within black bear habitat ranges from 22 percent of the habitat in Alternative A to 38 percent of the habitat in Alternative C.

Table 3-220

Acres of land within occupied Black Bear habitat, allocated to four LUD groupings.

Alternative	Intensive Development	Moderate Development	Natural Setting	Wilderness/ Monument
A	777,357	1,907,468	5,348,614	4,307,549
B	1,570,185	1,636,202	4,827,051	4,307,549
C	2,651,906	2,011,479	3,370,053	4,307,549
D	3,385,211	925,890	3,722,338	4,307,549
P	1,935,587	2,315,882	3,781,970	4,307,549

Source: Revision data base, Q260URAM, June 1991.

Table 3-221 displays potential changes in black bear habitat capability due to vegetative conditions plus increased human access and development for the following developments or activities: 1) communities; 2) cabins and developed campgrounds; 3) mainline roads with ferry access or towns; 4) road access to vehicles; and 5) accessible road within .5 miles of anadromous fish streams. In calculating the road access effects, the conservative assumption was all of the National Forest lands within the intensive and moderate LUD groupings would have road access by the year 2150 (i.e., all of the acres would have a road within 2 miles by the year 2150), and none of the roads would be closed. This is considered the maximum potential effects analysis as far as roads are concerned. Although not directly accounted for, permanent camp sites, temporary camp sites and seasonal camps would primarily be associated with the intensive and moderate prescription groupings and most of their effects would also be accounted for with the assumption used. Information on access points such as floatplane lakes, and trails were not available and are not included in Table 3-221.

Table 3-221

Estimated changes in Black Bear habitat capability due to changes in vegetative conditions plus effects of towns, cabins, campgrounds, and roads, compared to 1954 vegetative habitat capability

	Percent of 1954 Vegetative Habitat Capability						
Area	**1954**	**1990**	**A-15**	**B-15**	**C-15**	**D-15**	**P-15**
Chatham	99	99	91	88	82	85	81
Stikine	99	94	78	75	69	68	72
Ketchikan	97	92	80	79	73	73	75
Total	**98**	**94**	**82**	**79**	**73**	**73**	**75**

Source: Revisions data base, QURAM, June 1991; FORPLAN Analysis, June 1991; Suring, et al., 1988.

On a Forest-wide basis, estimated black bear habitat capability resulting from vegetative conditions plus influences of towns, cabins, campgrounds, and potential maximum effects of road access was 98 percent in 1954 compared to 1954 vegetative habitat capability; 94 percent in 1990, and by the 15th decade would be about 82 percent for Alternative A, 79 percent for Alternative B, 73 percent for Alternative C, 73 percent for Alternative D, and 75 percent for Alternative P.

Appendix L contains habitat capability estimates (due to vegetative conditions, towns, cabins, campgrounds, and potential maximum effects of road access) for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15.

A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-222. About 129 WAA's currently support black bear populations. In 1990, 104 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 14 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, 9 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels, and 2 WAA's had habitat capabilities with less than 50 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternative C has the highest number of WAA's with habitat capabilities below 50 percent after 150 years.

Table 3-222

Summary of changes in Black Bear habitat capabilities for ADF&G's Wildlife Analysis Areas.

Percent of 1954	No. of WAA's for 1990 and Decade 15 for Each Alt.					
Habitat Capability	1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	101	61	53	48	47	49
75-89 Percent	14	25	23	12	20	17
50-74 Percent	9	34	40	47	41	47
Less than 50 Percent	2	9	13	22	21	16

Source: Revision data base QURAM ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988.

The analysis presented above does not directly include the effects of open pit garbage dumps/landfills on non-National Forest lands. Some existing dumps/landfills are located on non-National Forest lands and are associated with communities. The effects of these dumps/landfills are in part indirectly accounted for with the effects of towns.

Current USDA Forest Service direction is to phase out all existing open pit garbage dumps/landfills and authorize no new ones on National Forest lands. The USDA Forest Service has been working with Alaska State agencies to phase out or require measures to reduce attracting bears at existing open pit garbage dumps/landfills.

On the Chatham Area, all of the timber operators on the area are incinerating their garbage and disposing of the ashes in a landfill in accordance with respective State Department of Environmental Conservation permits. There are no open pit garbage dumps/landfills under special use permit on the Chatham Area.

On the Ketchikan Area, six open pit garbage dumps/landfills currently exist on National Forest lands on Prince of Wales Island. Three of the sites are considered sources of potential conflict for black bears.

On the Stikine Area, several open pit garbage dumps/landfills exist at logging camps and cabins. However, some of the cabins on the Stikine area have had small incinerators installed to dispose of burnable garbage.

Adverse effects on bear habitat capability from open pit garbage dumps/landfills is likely less today than a few years ago due to efforts to close them and requirements for incineration.

The adverse effects from development and human access can be reduced with appropriate management activities, such as closing roads, closing open pit dumps, requiring incineration of burnable garbage, "pack-it-in, pack-it-out" requirements for recreational users, etc. Currently, 29 percent of the roads in black bear habitat on the Forest are closed. Direction has been developed to implement a Forest-wide program with necessary regulations to reduce or eliminate habituation of bears to human foods/garbage and reduce chances of human/bear incidents. Specific standards and guidelines can be found in Chapter 4 of the Proposed Revised Forest Plan and have been summarized earlier under the Management Indicator Species subheading of this section.

Marten

Table 3-223 displays estimated changes in marten winter habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Marten in Southeast Alaska: Winter Habitat," (Suring, et al., 1988, with 1991 revisions) was used. The estimated winter habitat capability for marten in 1954 was 17,264 marten. On a Forest-wide basis, the 1990 winter habitat capability for marten was 94 percent of 1954. In 1990 the Chatham Area was 97 percent of 1954 habitat capability, the Stikine Area was 95 percent, and the Ketchikan Area was 91 percent.

As described by Suring, et al. (1988), there is an estimated relationship between the amount of timber harvesting in old-growth forests and reductions in winter habitat capability. Alternative D with the highest allowable sale quantity has the highest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential for Forest-wide reduction in winter habitat capability. On a Forest-wide basis, at the end of the first decade, Alternatives A and B habitat capability is 92 percent of 1954; Alternatives C, D, and P are 90 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A habitat capability is 81 percent of 1954, Alternative B is 79 percent of 1954, Alternative C is 72 percent of 1954, Alternative D is 71 percent of 1954, and Alternative P is 74 percent of 1954.

Table 3-223

Estimated changes in Marten winter habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15.																				
		1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	6,360	97	94	94	91	89	94	93	90	87	90	88	84	80	91	89	85	80	89	88	84	81
Stikine	3,913	95	94	92	85	79	94	91	83	75	92	90	80	70	92	88	78	66	93	90	82	72
Ketchikan	6,991	91	90	88	82	75	90	88	81	74	89	86	76	66	88	85	74	65	90	86	77	68
Total	**17,264**	**94**	**92**	**91**	**86**	**81**	**92**	**90**	**85**	**79**	**90**	**88**	**80**	**72**	**90**	**87**	**79**	**71**	**90**	**88**	**81**	**74**

Source: Revision data base, QMAAM ALL, June 1991; FORPLAN Analysis, June 1991; Suring,can be found in Chapter 4 of the Proposed Revised Forest Plan and have been summarized earlier under the Management Indicator Species subheading of this section. et al. (1988, with 1991 revisions).

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15.

A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-224. About 176 WAA's have marten populations. In 1990, 148 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 20 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, and 8 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternative D has the highest number of WAA's with habitat capabilities below 50 percent after 15 decades.

Table 3-224

Summary of changes in Marten habitat capabilities for ADF&G's Wildlife Analysis Areas

Percent of 1954	No. of WAA's for 1990 and Decade 15 for Each Alt.					
Habitat Capability	1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	148	97	83	74	73	76
75-89 Percent	20	35	40	17	19	20
50-74 Percent	8	33	39	55	51	54
Less than 50 Percent	0	11	14	30	33	26

Source: Revision data base QMAAM ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988 (with 1991 revisions).

The estimated effects in Tables 3-223 and 3-224 do not include an evaluation of the effects of old-growth patch size as described by Suring, et al. (1988) (Figure 3-50). With the Revision data base, it was not possible to identify existing patch sizes for analysis, nor is it feasible to predict future patch sizes which may result from site-specific projects. However, Standards and Guidelines (Chapter 4, Proposed Revised Forest Plan) in the Biodiversity section provide for maintaining as large patch sizes as practical in project design.

The alteration of natural patch sizes by management activities is an issue primarily associated with areas of land which have been allocated to LUD's that allow considering timber harvesting. Natural old-growth patch sizes would be maintained with those areas of land allocated to LUD's with no scheduled timber harvest. Table 3-225 displays how land below 1500 feet elevation within occupied marten habitat is allocated among four LUD groupings for each of the alternatives. Old-growth patch sizes within the intensive and moderate development LUD groupings may be affected by timber harvesting. Within the areas of land allocated to timber management, there are many different patterns and options for laying out timber harvest units. Management for patch sizes is a site-specific project decision which is beyond the scope of a programmatic Forest Plan. Forest-wide Standards & Guidelines (see Chapter 4, Proposed Revised Forest Plan) for Wildlife and Biodiversity direct project-level analysis to evaluate old-growth patch sizes.

Figure 3-50

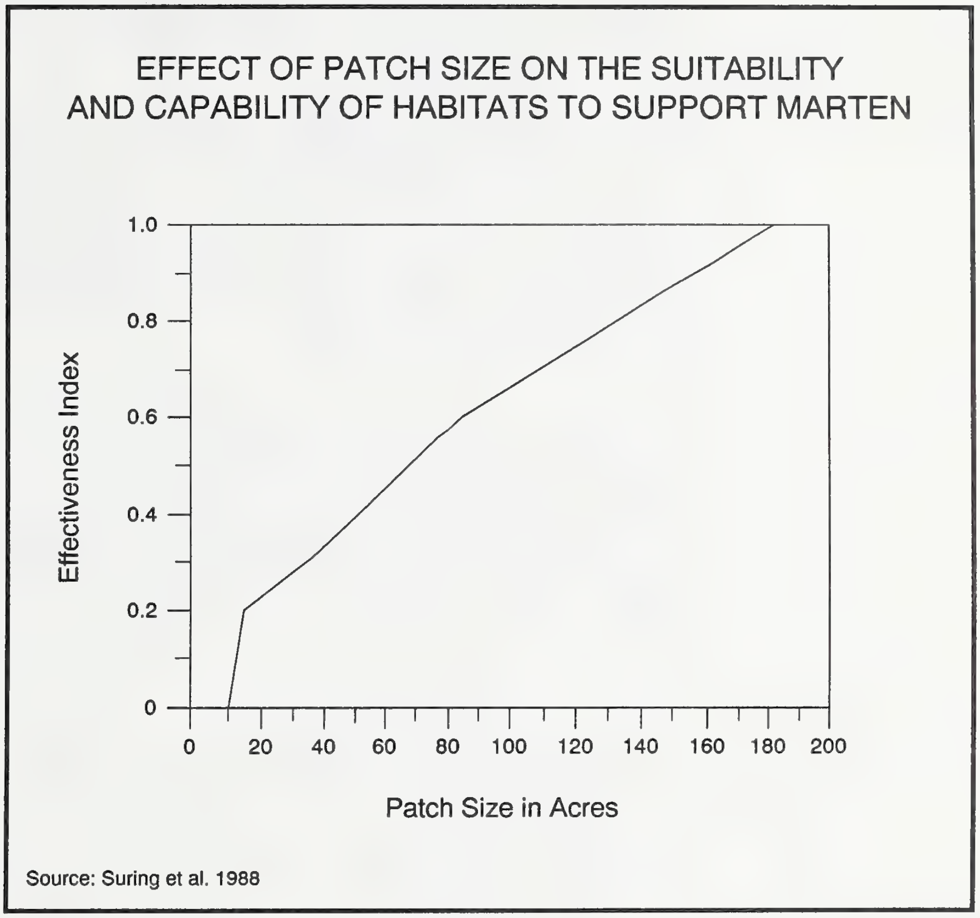


Table 3-225

Acres of land below 1500 feet elevation, within occupied Marten habitat, allocated to four LUD groupings

Alt.	Intensive Development	Moderate Development	Natural Setting	Wilderness/ Monument
A	723,837	1,659,841	4,000,392	2,998,092
B	1,444,556	1,491,693	3,483,820	2,998,092
C	2,335,364	1,786,127	2,298,579	2,998,092
D	3,125,245	991,880	2,302,945	2,998,092
P	1,850,941	1,938,714	2,630,415	2,998,092

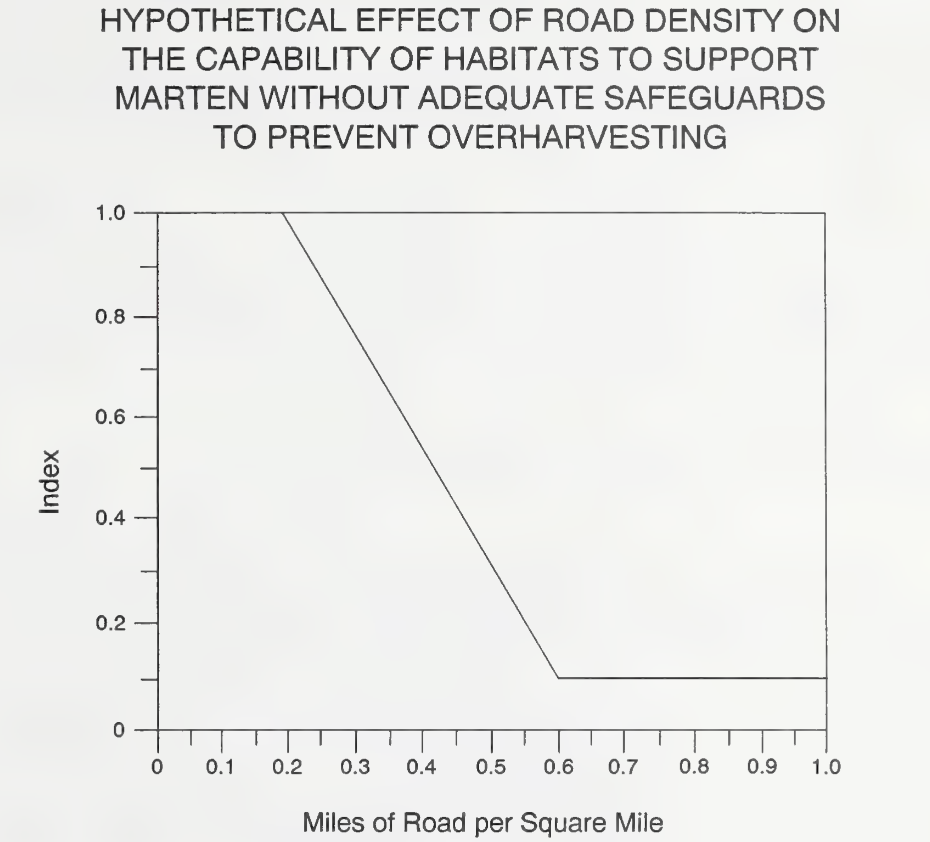
Source: Revision data base, Q260MAAM, June 1991.

Timber harvest and other resource development activities require the construction of roads. Roads provide additional access for trappers which may result in increased trapping of marten. Marten are easily trapped and can be overharvested especially where trapping pressure is heavy (Strickland, et al., 1982) and not effectively controlled.

An Interagency task group developed a hypothetical curve to display the potential effect of road density on overharvesting and the ability of habitats to support marten populations (Figure 3-51). This curve was applied to the marten habitat capability data and road density data for northern Prince of Wales Island; the results from applying the curve resulted in habitat capability being less than the number of marten currently being trapped (Interagency meeting notes, November 16, 1989). Therefore, more documentation and analysis is needed to verify this relationship. Regulating trapping seasons to prevent overharvesting has been the responsibility of the State of Alaska.

Not all of the roads will be open and available for public access all of the time. Many of the roads will be in locations where the only access to them is by boat or plane. Roads and access can be managed to reduce human presence when necessary to help maintain populations. Standards & guidelines provide that road management objectives will be determined on a site-specific basis. If the need to restrict access is identified during project interdisciplinary review, roads will be closed, either seasonally or yearlong, to minimize adverse effects on fish and wildlife.

Figure 3-51



Source: Suring et al. 1988

River Otter

Table 3-226 displays estimated changes in river otter spring/early summer habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for River Otter in Southeast Alaska: Spring Habitat," (Suring, et al., 1988) was used.

The estimated spring/early summer habitat capability for river otter in 1954 was 8,126 otters. On a Forest-wide basis, the 1990 habitat capability for river otter was 93 percent of 1954. In 1990 the Chatham Area was 93 percent of 1954 habitat capability, the Stikine Area was 95 percent, and the Ketchikan Area was 92 percent.

As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting within beach fringe and riparian areas and reductions in spring/early summer habitat capability. Alternative D is the only alternative which has the beach fringe allocated to LUD's which allow scheduled timber harvesting. All alternatives are responsive to the the Tongass Timber Reform Act legislation requiring minimum no commercial timber harvest 100-foot buffers on both sides of all Class I and of all Class II streams which flow directly into Class I

streams. Alternatives A, B, C and P have no measurable changes in river otter habitat capability. Alternative D habitat capabiilty is estimated to be 83 percent of 1954 at the end of the first decade, and 75 percent of 1954 at the end of the 15th decade.

Table 3-226

Estimated changes in River Otter spring/early summer habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15.																				
		1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	3,158	93	93	93	93	93	93	93	93	93	93	93	93	93	86	83	78	73	93	93	93	93
Stikine	2,081	95	95	95	95	95	95	95	95	95	95	95	95	95	78	73	59	48	95	95	95	95
Ketchikan	2,887	92	92	92	92	92	92	92	92	92	92	92	92	92	75	68	58	47	92	92	92	92
Total	**8,126**	**93**	**93**	**93**	**92**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**93**	**79**	**75**	**65**	**57**	**93**	**93**	**93**	**93**

Source: Revision data base, QLUCA ALL, June 1991; FORPLAN Analysis, June 1991; Suring, et al. (1988).

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-227.

About 185 WAA's have river otter populations. In 1990, 146 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 32 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, 5 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels, and 2 WAA's had habitat capabilities less than 50 percent of 1954 levels. Alternatives A, B, C, and P maintain habitat capabilities at 1990 levels. Various amounts of reduction in habitat capability will occur in about 89 WAA's with Alternative D.

Table 3-227

Summary of changes in River Otter habitat capabilities for ADF&G's Wildlife Analysis Areas.

Percent of 1954 Habitat Capability	No. of WAA's for 1990 and Decade 15 for Each Alt.					
	1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	146	146	146	146	88	146
75-89 Percent	32	32	32	32	34	32
50-74 Percent	5	5	5	5	38	5
Less than 50 Percent	2	2	2	2	25	2

Source: Revision data base QLUCA ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988.

The estimates of river otter habitat capability presented above and in Appendix L underestimate the total habitat capability on the Tongass because several Wilderness areas do not have riparian area data in the Forest-wide data base; the result is that habitat capability will be underestimated for those areas. Riparian buffers which have been maintained along rivers and streams in areas which have been roaded and logged are also not inventoried in the GIS data base. These riparian buffers help maintain habitat capability for river otters, and since they are not 100 percent inventoried in the GIS Revision data base, the result is an underestimate of habitat capability and an overestimate of effects resulting from timber harvest activity.

Red Squirrel

Table 3-228 displays estimated changes in red squirrel habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Red Squirrels in Southeast Alaska," (Suring, et al., 1988) was used. The estimated habitat capability for red squirrels in 1954 was 6,749,426 red squirrels. On a Forest-wide basis, the 1990 habitat capability was 98 percent of 1954. In 1990 the Chatham Area was 99 percent of 1954 habitat capability, the Stikine Area was 97 percent, and the Ketchikan Area was 99 percent.

As described by Suring, et al. (1988), red squirrels are a MIS which have suitable habitat in second-growth timber when the stands are old enough to produce cones. Therefore, the amount of change among the alternatives is not as great as with some of the other MIS. In decade 15, the percent of 1954 habitat capability for each of the Alternatives is: A = 96 percent, B = 95 percent, C = 93 percent, D = 93 percent, and P = 93 percent.

Table 3-228

Estimated changes in Red Squirrel habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15.																				
		1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	3,470,308	99	98	97	96	97	97	96	95	96	94	93	91	92	95	94	91	93	94	93	91	92
Stikine	1,742,712	97	96	95	90	93	96	94	89	92	95	93	87	90	94	92	85	89	95	94	88	91
Ketch.	1,536,406	99	98	98	97	98	98	98	97	97	98	98	96	97	98	97	97	97	98	98	97	97
Total	**6,749,426**	**98**	**97**	**97**	**95**	**96**	**97**	**96**	**94**	**95**	**95**	**94**	**91**	**93**	**95**	**94**	**91**	**93**	**95**	**94**	**91**	**93**

Source: Revision data base, QTAHU ALL, June 1991; FORPLAN Analysis, June 1991; Suring, et al. 1988.

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-229.

About 160 WAA's have red squirrel populations. In 1990, 159 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, one WAA had habitat capability between 75 to 89 percent of 1954 levels. Alternative D, which has the highest amount of timber management activity, produces the most change in red squirrel habitat capability.

Table 3-229

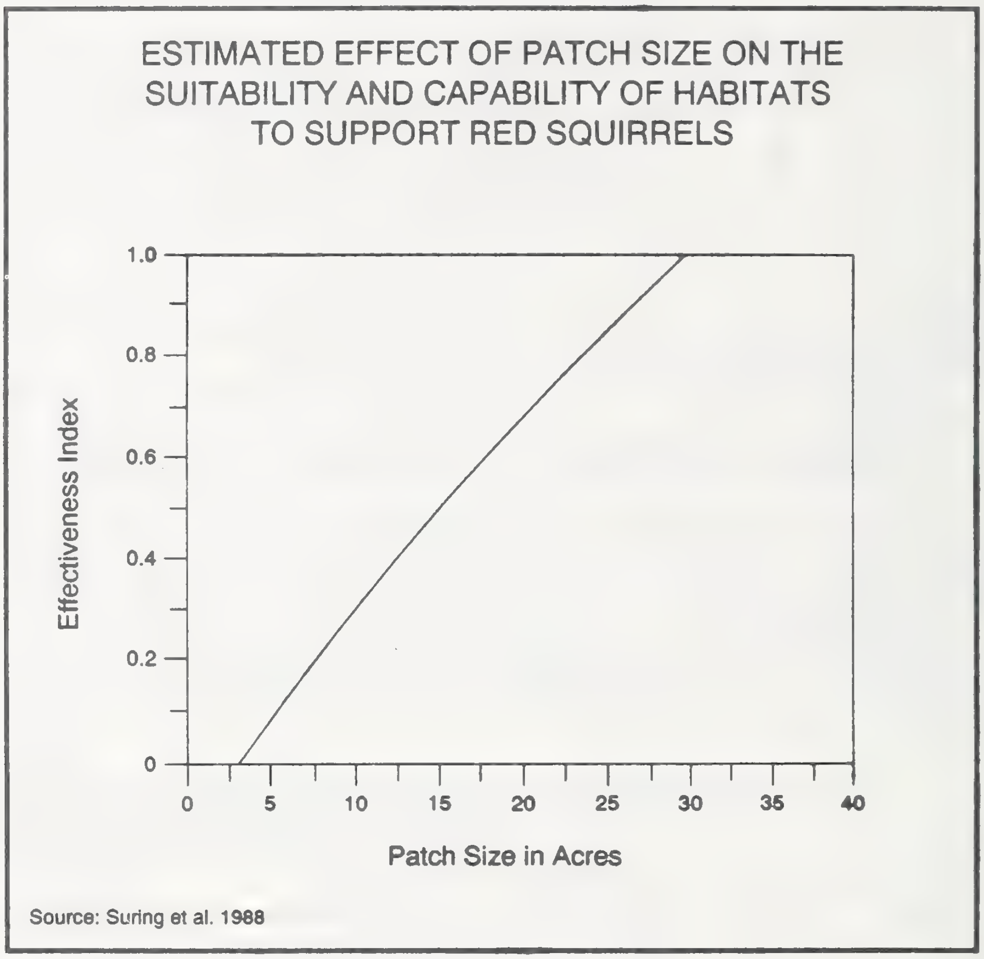
Summary of changes in Red Squirrel habitat capabilities for ADF&G's Wildlife Analysis Areas.

Percent of 1954 Habitat Capability	No. of WAA's for 1990 and Decade 15 for Each Alt.					
	1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	159	140	135	118	121	118
75-89 Percent	1	17	22	31	25	35
50-74 Percent	0	3	3	11	13	7
Less than 50 Percent	0	0	0	0	1	0

Source: Revision data base QTAHU ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988.

The preceding habitat capability estimates do not include an evaluation of the effects of old-growth patch size as described by Suring, et al. (1988) (Figure 3-52). With the Revision data base, it was not possible to identify patch sizes for analysis. It is not anticipated that many patches will be less than the 30 acre optimum size in any alternative; therefore, additional reductions in habitat capability due to small patch sizes are expected to be very small.

Figure 3-52



Gray Wolf

In making estimates of changes in gray wolf habitat capability, the "Habitat Capability Model for Gray Wolves in Southeast Alaska," (Suring, et al., 1988) was used. The following briefly documents the analysis steps:

1. Research in Southeast Alaska indicates wolf populations can exist in low numbers in the absence of large ungulate prey species, with densities of about .01 wolf per square mile (Suring, et al., 1988). This density is used as a minimum habitat capability for wolves on the Forest. To calculate this, we used the acres of National Forest land within occupied

wolf habitat, minus the acres of rock, ice, and water (primarily lakes). We assumed that the acres of rock, ice and water would not contribute to wolf habitat capability. This minimum habitat capability for wolves was calculated to be 152 animals.

2. To calculate the number of wolves supported by the moose population in Southeast Alaska, we used the existing winter moose populations estimated by ADF&G in their "Strategic Plan for Management of Moose in Region I, Southeast Alaska, 1990-1994" (ADF&G, 1991). The wolf habitat capability provided by the existing winter moose population was calculated to be 11 wolves. The estimated winter moose population was held constant in calculating future changes in wolf habitat capability. ADF&G estimates stable or increasing moose populations in their strategic plan (ADF&G, 1991). Moose analysis presented later in this section of the Supplemental DEIS indicates that most moose populations will not be affected by Forest Service management actions, and natural vegetation succession will be the primary factor affecting moose habitat and populations.

3. To calculate the number of wolves supported by mountain goat populations, we used the estimated winter mountain goat habitat capability from the mountain goat habitat capability model (Suring, 1988). The wolf habitat capability provided by the winter mountain goat habitat capability was calculated to be nine wolves. The estimated winter mountain goat population was held constant in calculating future changes in wolf habitat capability. Mountain goat habitat analysis presented in this section of the Supplement indicates that future habitat capability for mountain goats will be near present habitat capabilities.

4. To calculate the number of wolves supported by Sitka black-tailed deer populations, we used the winter deer habitat capability from the deer habitat capability model (Suring 1988, with 1991 revisions). The deer habitat capability model has two sets of values, one set estimating the effects of wolf predation and one set without the effects of wolf predation. The set of values estimating the effects of wolf predation were designed to estimate the deer habitat capability which would be available for human harvests after wolf predation. Therefore, to calculate the deer habitat capability available to support wolves, we used the deer model values without the effects of wolves. In 1954, the wolf habitat capability provided by the winter deer habitat capability was calculated to be 667 wolves. Since most of the wolf habitat capability as described by Suring, et al. (1988) comes from Sitka black-tailed deer, estimates of future changes in wolf habitat capability for each alternative could parallel the changes in Sitka black-tailed deer habitat capability.

Table 3-230 displays estimated changes in gray wolf habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. The estimated habitat capability in 1954 was 839 wolves. On a Forest-wide basis, the 1990 habitat capability for wolves was 93 percent of 1954 (a 7 percent reduction). In 1990 the Chatham Area was 96 percent of 1954 habitat capability, the Stikine Area was 95 percent, and the Ketchikan Area was 92 percent.

On a Forest-wide basis, at the end of the first decade, Alternatives A, B, and P habitat capability is 91 percent of 1954, Alternative C is 90 percent of 1954, and Alternative D is 89 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A habitat capability is 76 percent of 1954, Alternative B is 75 percent of 1954, Alternative C is 68 percent of 1954, Alternative D is 66 percent of 1954, and Alternative P is 71 percent of 954.

Table 3-230

Estimated changes in Gray Wolf habitat capability for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15. 1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	57	96	96	96	96	96	96	96	95	95	96	96	93	93	96	96	96	93	96	96	93	93
Stikine	284	95	92	90	85	78	92	90	83	75	92	88	80	71	90	87	77	66	91	89	81	74
Ketchikan	498	92	90	88	81	73	90	87	80	72	88	85	75	63	88	84	73	63	90	87	76	66
Total	**839**	**93**	**91**	**89**	**83**	**76**	**91**	**89**	**82**	**75**	**90**	**87**	**78**	**68**	**89**	**86**	**76**	**66**	**91**	**88**	**79**	**71**

Source: Revision data base, QCALU ALL, QORAM ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al.,1988; ADF&G 1991.

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-231. About 122 WAA's are within occupied gray wolf habitat. In 1990, 97 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 18 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, and seven WAA's had habitat capabilities between 50 to 74 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternative D has the highest number of WAA's with habitat capabilities below 50 percent by the 15th decade.

Table 3-231

Summary of changes in Gray Wolf habitat capabilities for ADF&G's Wildlife Analysis Areas

Percent of 1954 Habitat Capability	No. of WAA's for 1990 and Decade 15 for Each Alt. 1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	97	66	64	55	55	56
75-89 Percent	18	20	20	15	14	18
50-74 Percent	7	29	29	36	32	35
Less than 50 Percent	0	7	9	16	21	13

Source: Revision data base, QCALU ALL, QORAM ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988; ADF&G, 1991.

Bald Eagle

Table 3-232 displays estimated changes in bald eagle nesting habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Bald Eagles in Southeast Alaska: Nesting Habitat," (Suring, et al., 1988) was used. The estimated nesting habitat capability for bald eagles in 1954 was 20,179 eagles. On a Forest-wide basis, the 1990 habitat capability for bald eagles was 92 percent of 1954. In 1990 the Chatham Area was 92 percent of 1954 habitat capability, the Stikine Area was 94 percent, and the Ketchikan Area was 90 percent.

As described by Suring, et al. (1988), there is a relationship between the amount of timber harvesting within beach fringe and riparian areas and reductions in nesting habitat capability. Alternative D is the only alternative which has the beach fringe allocated to LUD's which allow

scheduled timber harvesting. All alternatives are responsive to the the Tongass Timber Reform Act legislation requiring minimum 100 foot no commercial timber harvest buffers along all Class I streams and all Class II streams that flow directly into Class I streams. All alternatives implement the Interagency Agreement between the U. S. Forest Service and the U. S. Fish and Wildlife Service for the management of bald eagles in Southeast Alaska which includes a 330 foot no harvest buffer around all inventoried nests. Alternatives A, B, C and P have no measurable changes in bald eagle habitat capability. Alternative D habitat capability is estimated to be 84 percent of 1954 at the end of the first decade, and 64 percent of 1954 at the end of the 15th decade.

Table 3-232

Estimated changes in Bald Eagle nesting habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15. 1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	8,248	92	92	92	92	92	92	92	92	92	92	92	92	92	81	78	73	69	92	92	92	92
Stikine	5,292	94	94	94	94	94	94	94	94	94	94	94	94	94	88	85	75	63	94	94	94	94
Ketchikan	6,639	90	90	90	90	90	90	90	90	90	90	90	90	90	83	77	67	59	90	90	90	90
Total	**20,179**	**92**	**92**	**92**	**92**	**92**	**92**	**92**	**92**	**92**	**92**	**92**	**92**	**92**	**84**	**80**	**72**	**64**	**92**	**92**	**92**	**92**

Source: Revision data base, QHALE ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al. 1988.

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-233. About 185 WAA's have bald eagle nesting habitat capability. In 1990, 144 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 26 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, 11 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels, and 4 WAA's had habitat capabilities less than 50 percent of 1954 levels. All alternatives except D are expected to maintain existing habitat capability levels for bald eagles in every WAA.

Table 3-233

Summary of changes in Bald Eagle habitat capabilities for ADF&G's Wildlife Analysis Areas

Percent of 1954 Habitat Capability	No. of WAA's for 1990 and Decade 15 for Each Alt. 1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	144	144	144	144	73	144
75-89 Percent	26	26	26	26	21	26
50-74 Percent	11	11	11	11	36	11
Less than 50 Percent	4	4	4	4	54	4

Source: Revision data base QHALE ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988.

The above estimates of bald eagle habitat capability are an underestimate of the total habitat capability on the Tongass because some Wilderness areas do not have riparian area data in the

Forest-wide data base; the result is that habitat capability is underestimated for those areas. Riparian buffers which have been maintained along rivers and streams in areas which have been roaded and harvested are also not inventoried precisely in the data base. These riparian buffers help maintain habitat capability for bald eagles, and when they are not inventoried in the GIS data base, the result is an underestimate of habitat capability and an overestimate of effects due to timber harvest activity.

Changes in nesting habitat capability do not mean that bald eagle populations in Southeast Alaska have changed in like manner. Nesting habitat has not been determined to be limiting bald eagle populations in Southeast Alaska at this time. The U. S. Fish and Wildlife Service has conducted adult bald eagle population surveys for the years 1967, 1977, 1982, and 1987. Adult population estimates for these surveys are: 1967 - 7,230; 1977 - 7,329; 1982 - 10,933; 1987 - 12,074 (Jacobson, 1989).

The above estimates for nesting habitat capability indicate that there is unused nesting habitat capability when compared to the existing adult bald eagle population estimate. Additional nesting habitat capability also exists on non-National Forest lands in Southeast Alaska, and this further indicates that not all of the available nesting habitat capability is currently used by the bald eagle population.

There are other factors which indicate that more than just the availability of suitable nest trees affects the abundance and distribution of bald eagles. For one, nest survey data from the U.S. Fish and Wildlife Service illustrate that nest densities along the coast range from a high of 10.4 nests per mile of shoreline to zero nests per mile of shoreline, and this range is not solely the result of the presence or absence of suitable nest trees.

An Interagency Agreement is maintained between the U.S. Fish and Wildlife Service and the USDA Forest Service for bald eagle management in Southeast Alaska. This interagency agreement provides standards and guidelines for management of bald eagle nest sites. These standards and guidelines are incorporated in the Forest-wide standards and guidelines in Chapter 4 of the Proposed Revised Forest Plan focusing on:

1. Contact the Fish and Wildlife Service if an encroachment upon the five chain tree management zone by a planned land use activity appears unavoidable. In each case the Forest Service will request, in writing, a variance to the terms of the Interagency Agreement. Requests for variances will be supported by aerial photos, large scale maps indicating the nest location, description of the nest location including distances from notable geographic reference points, presentation of the alternatives considered, an assessment of the potential impacts associated with each alternative, and a statement of the preferred course of action. If the Forest Service and Fish and Wildlife Service deem it necessary, a joint analysis of the situation, including assessment of alternatives will be conducted at the site. Any habitat management recommendations developed and agreed to during the onsite analysis will be included as part of a variance to the terms of the Interagency Agreement.

2. Habitats for perching and winter roosting.

3. Blasting within one-half mile of eagles or active nests.

There is concern that the 330 foot (100 meter) radius nest buffer may not be adequate to provide long-term protection of specific nest sites. These 330 foot nest buffers may not be windfirm if timber harvest or related activities occur adjacent to these protective zones. An additional adverse impact on bald eagle nesting habitat capability can be expected as a result of blowdown of nest tree buffer zones. Hodges (1982) found that an average of 17 percent of the

330 foot protective buffer could be lost to blowdown in 42 percent of the buffer zones adjacent to clearcuts on just one side of the zone. The proportion of the buffer zone lost to blowdown would be greater if the clearcut surrounded the buffer zone. This loss occurred within the first five years after harvest. This equates to an additional seven percent reduction in long-term bald eagle nesting habitat capability within identified bald eagle nest buffers.

The Forest Service is currently funding bald eagle research in Southeast Alaska to obtain more information about the management of nesting habitat.

With the current analysis and understanding of the adult bald eagle population and the total nesting habitat capability on the Forest, it appears that the existing bald eagle population can be maintained with adequate nesting habitat for all alternatives for 150 years.

Hairy Woodpecker

Table 3-234 displays estimated changes in hairy woodpecker winter habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Hairy Woodpeckers in Southeast Alaska: Winter Habitat," (Suring, et al., 1988) was used. The estimated winter habitat capability for hairy woodpeckers in 1954 was 119,282 birds. On a Forest-wide basis, the 1990 winter habitat capability was 85 percent of 1954 (a 15 percent reduction). In 1990 the Chatham Area was 92 percent of 1954 habitat capability, the Stikine Area was 84 percent, and the Ketchikan Area was 80 percent.

As described by Suring, et al. (1988), there is an estimated relationship between the amount of timber harvesting in old-growth forests and reductions in winter habitat capability.

Alternatives C and D with the highest allowable sale quantities have the highest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential for Forest-wide reduction in winter habitat capability. On a Forest-wide basis, at the end of the first decade, Alternatives A's habitat capability is 83 percent of 1954, Alternative B is 82 percent of 1954, Alternative C is 80 percent of 1954, Alternative D is 79 percent of 1954, and Alternative P is 80 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A's habitat capability is 69 percent of 1954, Alternative B is 66 percent of 1954, Alternative C is 57 percent of 1954, Alternative D is 57 percent of 1954, and Alternative P is 59 percent of 1954.

Table 3-234

Estimated changes in Hairy Woodpecker winter habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

	Habitat Capability	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15.																				
Area	in 1954	1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	41,878	92	89	88	86	83	89	87	83	80	85	82	77	72	86	83	78	73	85	83	77	73
Stikine	27,144	84	81	78	69	63	80	77	66	59	79	74	62	53	78	73	59	48	80	75	63	55
Ketchikan	50,260	80	78	73	67	60	77	73	65	58	76	69	58	48	75	68	58	47	76	70	60	51
Total	**119,282**	**85**	**83**	**80**	**74**	**69**	**82**	**79**	**72**	**66**	**80**	**75**	**66**	**57**	**79**	**75**	**65**	**57**	**80**	**76**	**67**	**59**

Source: Revision data base, QPIVI ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al. (1988).

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-235. About 185 WAA's have estimated hairy woodpecker winter habitat capabilities. In 1990, 129 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 26 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, 21 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels, and 9 WAA's had habitat capabilities less than 50 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternative C has the highest number of WAA's with habitat capabilities below 50 percent.

Table 3-235

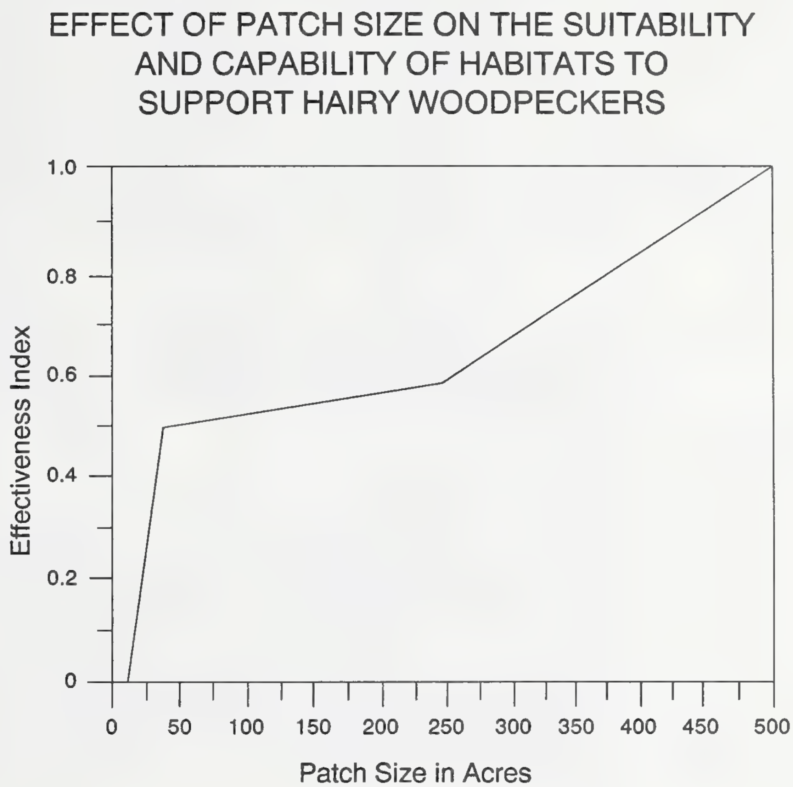
Summary of changes in Hairy Woodpecker habitat capabilities for ADF&G's Wildlife Analysis Areas.

Percent of 1954	No. of WAA's for 1990 and Decade 15 for Each Alt.					
Habitat Capability	1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	129	88	81	74	70	77
75-89 Percent	26	27	23	13	12	14
50-74 Percent	21	33	38	22	34	24
Less than 50 Percent	9	37	43	76	69	70

Source: Revision data base QPIVI ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988.

The estimated effects in Tables 3-234 and 3-235 do not include an evaluation of the effects of old-growth patch size as described by Suring, et al. (1988) (Figure 3-53). With the Revision data base, it was not possible to identify existing patch sizes for analysis, nor is it feasible to predict future patch sizes which may result from site-specific projects.

Figure 3-53



Source: Suring et al. 1988

The alteration of natural patch sizes by management activities is an issue primarily associated with areas of land which have been allocated to LUD's that allow considering timber harvesting. Natural old-growth patch sizes would be maintained within those areas of land allocated to LUD's with no scheduled timber harvest. Table 3-236 displays how National Forest land is allocated among four LUD groupings for each of the alternatives. Old-growth patch sizes within the intensive and moderate development LUD groupings may be affected by timber harvesting.

Within the areas of land allocated to timber management, there are many different patterns and options for laying out timber harvest units. Management for patch sizes is a site-specific project decision which is beyond the scope of a programmatic Forest Plan. Forest-wide Standards & Guidelines (see Chapter 4, Proposed Revised Forest Plan) for Wildlife and Biodiversity direct project-level analysis to evaluate old-growth patch sizes.

Table 3-236

Acres of land allocated to four LUD groupings.

Alt.	Intensive Development	Moderate Development	Natural Setting	Wilderness/ Monument
A	821,068	2,431,151	7,814,013	5,931,024
B	1,842,685	2,124,883	7,098,663	5,931,024
C	3,148,598	2,627,980	5,289,655	5,931,024
D	4,148,845	1,383,050	5,534,337	5,931,024
P	2,480,326	2,769,827	5,816,079	5,931,024

Source: Revision data base, Q260, June 1991.

Red-Breasted Sapsucker

Table 3-237 displays estimated changes in red-breasted sapsucker breeding habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Red-breasted Sapsuckers in Southeast Alaska: Breeding Habitat," (Suring, et al., 1988) was used. The estimated breeding habitat capability for red-breasted sapsuckers in 1954 was 986,307 birds. On a Forest-wide basis, the 1990 breeding habitat capability was 96 percent of 1954. In 1990 the Chatham Area was 98 percent of 1954 habitat capability, the Stikine Area was 96 percent, and the Ketchikan Area was 93 percent.

As described by Suring, et al. (1988), there is an estimated relationship between the amount of timber harvesting in old-growth forests and reductions in breeding habitat capability. Alternatives C and D with the highest allowable sale quantities have the highest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential for Forest-wide reduction in winter habitat capability.

On a Forest-wide basis, at the end of the first decade, Alternative A's habitat capability is 94 percent of 1954, Alternative B is 93 percent of 1954, Alternative C is 90 percent of 1954, Alternative D is 91 percent of 1954, and Alternative P is 90 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A's habitat capability is 80 percent of 1954, Alternative B is 77 percent of 1954, Alternative C is 69 percent of 1954, Alternative D is 68 percent of 1954, and Alternative P is 71 percent of 1954.

Table 3-237

Estimated changes in Red-breasted Sapsucker breeding habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

	Habitat Capability	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15.																				
Area	in 1954	1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	373,136	98	95	94	91	89	94	93	89	86	88	87	82	78	90	89	84	79	88	86	82	79
Stikine	235,956	96	94	91	82	75	94	90	80	70	92	88	77	63	92	87	74	60	93	89	78	66
Ketchikan	377,215	93	92	90	82	76	92	89	80	74	90	87	75	64	90	87	74	63	91	88	76	67
Total	**986,307**	**96**	**94**	**92**	**85**	**80**	**93**	**91**	**84**	**77**	**90**	**87**	**78**	**69**	**91**	**88**	**78**	**68**	**90**	**88**	**79**	**71**

Source: Revision data base, QSPVA ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al. (1988).

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-238.

About 189 WAA's have estimated red-breasted sapsucker habitat capabilities. In 1990, 163 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 20 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, and 6 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other Alternatives, while Alternative C has the highest number of WAA's with habitat capabilities below 50 percent.

Table 3-238

Summary of changes in Red-breasted Sapsucker habitat capabilities for ADF&G's Wildlife Analysis Areas

Percent of 1954 Habitat Capability	No. of WAA's for 1990 and Decade 15 for Each Alt. 1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	163	104	91	82	78	86
75-89 Percent	20	31	30	13	12	17
50-74 Percent	6	34	47	38	48	38
Less than 50 Percent	0	20	21	56	50	48

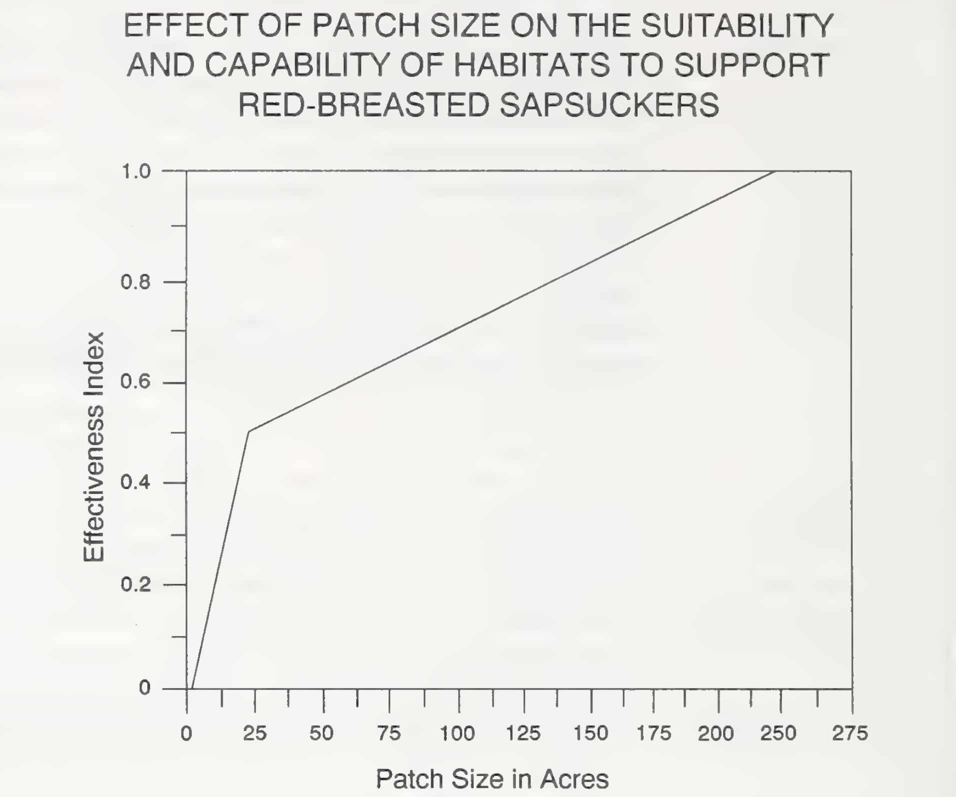
Source: Revision data base QSPVA ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988.

The estimated effects in Tables 3-237 and 3-238 do not include an evaluation of the effects of old-growth patch size as described by Suring, et al. (1988) (Figure 3-54). With the Revision data base, it was not possible to identify existing patch sizes for analysis, nor is it feasible to predict future patch sizes which may result from site-specific projects.

The alteration of natural patch sizes by management activities is an issue primarily associated with areas of land which have been allocated to LUD's that allow considering timber harvesting. Natural old-growth patch sizes would be maintained with those areas of land allocated to LUD's with no scheduled timber harvest. Table 3-239 displays how National Forest land is allocated among four LUD groupings for each of the alternatives. Old-growth patch sizes within the intensive and moderate development LUD groupings will likely be fragmented to some extent over time by timber harvesting.

Within the areas of land allocated to timber management, there are many different patterns and options for laying out timber harvest units. Management for patch sizes is a site-specific project decision which is beyond the scope of a programmatic Forest Plan. Forest-wide Standards & Guidelines for Wildlife and Biodiversity direct project-level analysis to evaluate old-growth patch sizes.

Figure 3-54



Source: Suring et al. 1988

Table 3-239

Acres of land allocated to four LUD groupings.

Alt.	Intensive Development	Moderate Development	Natural Setting	Wilderness/ Monument
A	821,068	2,431,151	7,814,013	5,931,024
B	1,842,685	2,124,883	7,098,663	5,931,024
C	3,148,598	2,627,980	5,289,655	5,931,024
D	4,148,845	1,383,050	5,534,337	5,931,024
P	2,480,326	2,769,827	5,816,079	5,931,024

Source: Revision data base, Q260, June 1991.

Brown Creeper

Table 3-240 displays estimated changes in brown creeper winter habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Brown Creepers in Southeast Alaska: Winter Habitat," (Suring, et al., 1988) was used.

The estimated winter habitat capability for brown creepers in 1954 was 142,653 birds. On a Forest-wide basis, the 1990 winter habitat capability was 63 percent of 1954 (a 37 percent reduction). In 1990 the Chatham Area was 76 percent of 1954 habitat capability, the Stikine Area was 54 percent, and the Ketchikan Area was 58 percent.

As described by Suring, et al. (1988), there is an estimated relationship between the amount of timber harvesting in old-growth forests and reductions in winter habitat capability. Since the brown creeper habitat capability model indicates that higher volume old-growth forests have the highest habitat capabilities, and most of the timber harvesting since 1954 has occurred within the higher volume old-growth stands, the estimated changes in habitat capability are greater for the brown creeper than any of the other MIS. Alternatives C and D with the highest allowable sale quantities have the highest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential for Forest-wide reduction in winter habitat capability. On a Forest-wide basis, at the end of the first decade, Alternatives A habitat capability is 59 percent of 1954, Alternative B is 59 percent of 1954, Alternative C is 57 percent of 1954, Alternative D is 59 percent of 1954, and Alternative P is 59 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A habitat capability is 49 percent of 1954, Alternative B is 46 percent of 1954, Alternative C is 39 percent of 1954, Alternative D is 41 percent of 1954, and Alternative P is 41 percent of 1954.

Table 3-240

Estimated changes in Brown Creeper winter habitat capability due to changes in vegetative conditions for each alternative, compared to 1954

Area	Habitat Capability in 1954	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15																				
		1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	43,448	76	75	74	74	71	75	72	72	68	73	71	69	62	74	73	69	63	74	73	69	63
Stikine	27,910	54	48	46	42	38	46	44	39	35	46	42	35	31	47	43	37	33	47	43	37	33
Ketchikan	71,295	58	54	48	46	40	54	48	44	37	52	40	38	29	54	42	40	32	54	42	40	32
Total	**142,653**	**63**	**59**	**55**	**54**	**49**	**59**	**54**	**52**	**46**	**57**	**50**	**47**	**39**	**59**	**51**	**48**	**41**	**59**	**51**	**48**	**41**

Source: Revision data base, QCEFA ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al. (1988).

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-241.

About 185 WAA's have estimated brown creeper winter habitat capabilities. In 1990, 106 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 16 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, 29 WAA's had habitat capabilities

between 50 to 74 percent of 1954 levels, and 40 WAA's had habitat capabilities less than 50 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternative C has the highest number of WAA's with habitat capabilities below 50 percent.

Table 3-241

Summary of changes in Brown Creeper habitat capabilities for ADF&G's Wildlife Analysis Areas

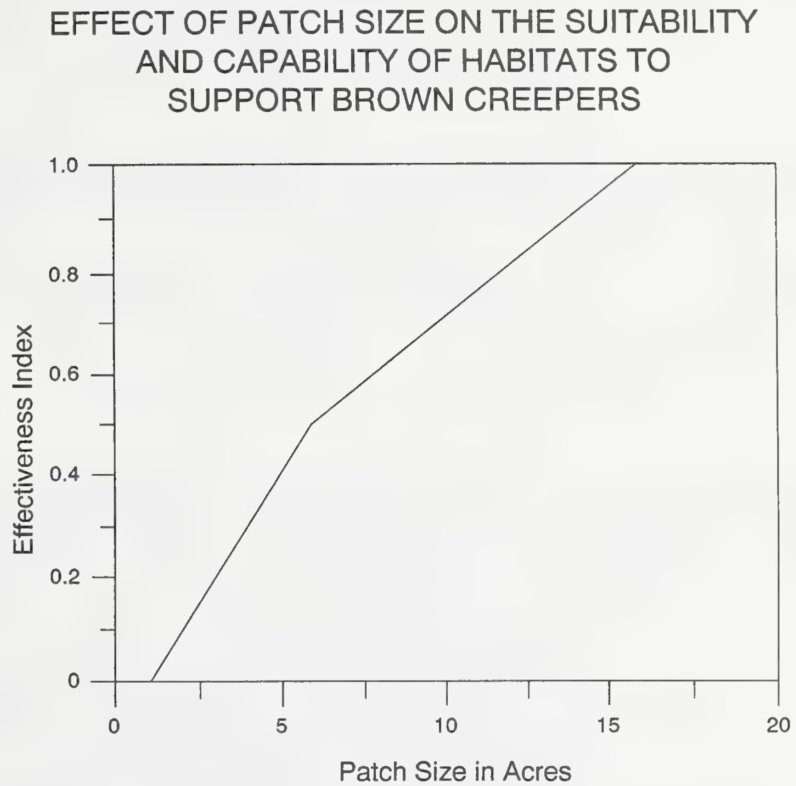
Percent of 1954 Habitat Capability	No. of WAA's for 1990 and Decade 15 for Each Alt. 1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	106	82	75	73	74	74
75-89 Percent	16	17	17	8	10	10
50-74 Percent	23	29	33	18	21	21
Less than 50 Percent	40	57	60	86	80	80

Source: Revision data base QCEFA ALL, June 1991; FORPLAN analysis, June 1991; Suring, et al., 1988.

The estimated effects in Tables 3-240 and 3-241 do not include an evaluation of the effects of old-growth patch size as described by Suring, et al. (1988) (Figure 3-55). With the Revision data base, it was not possible to identify existing patch sizes for analysis, nor is it feasible to predict future patch sizes which may result from site-specific projects. However, it is not expected that a large amount of patch sizes will be less than the 15-20 acre optimum size in any alternative; therefore, additional reductions in habitat capability due to small patch sizes are expected to be very small.

Within the areas of land allocated to timber management, there are many different patterns and options for layout out timber harvet units. Management for patch sizes is a site-specific project decision which is beyond the scope of a programmatic Forest Plan. Forest-wide Standards and Guidelines for MIS and biological diversity direct project-level analysis to evaluate old-growth patch sizes.

Figure 3-55



Source: Suring et al. 1988

Vancouver Canada Goose

Table 3-242 displays estimated changes in Vancouver Canada goose nesting and brood rearing habitat capability for each of the three Administrative Areas of the Forest and Forest-wide. In making these estimates, the "Habitat Capability Model for Vancouver Canada Geese in Southeast Alaska: Nesting and Brood Rearing Habitat," (Doyle, et al., 1988) was used.

The estimated habitat capability for geese in 1954 was 20,857 birds. On a Forest-wide basis, the 1990 habitat capability was 95 percent of 1954 (a 5 percent reduction). In 1990 the Chatham Area was 97 percent of 1954 habitat capability, the Stikine Area was 97 percent, and the Ketchikan Area was 93 percent.

As described by Doyle, et al. (1988), there is an estimated relationship between the amount of timber harvesting in old-growth forests and reductions in nesting and brood rearing habitat capability. Alternatives C and D with the highest allowable sale quantities have the highest potential for Forest-wide reduction in habitat capability, while Alternative A with the lowest allowable sale quantity has the lowest potential for Forest-wide reduction in winter habitat capability.

On a Forest-wide basis, at the end of the first decade, Alternative A's habitat capability is 94 percent of 1954, Alternative B is 93 percent of 1954, Alternative C is 91 percent of 1954, Alternative D is 91 percent of 1954, and Alternative P is 91 percent of 1954. On a Forest-wide basis, at the end of the 15th decade, Alternative A habitat capability is 82 percent of 1954, Alternative B is 79 percent of 1954, Alternative C is 72 percent of 1954, Alternative D is 71 percent of 1954, and Alternative P is 74 percent of 1954.

Table 3-242

Estimated changes in Vancouver Canada Goose nesting and brood rearing habitat capability due to vegetative changes for each alternative, compared to 1954

	Habitat Capability	Percent of 1954 Habitat Capability for 1990, and Each Alternative for Decades 1, 2, 5, and 15.																				
Area	in 1954	1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
Chatham	5,175	97	94	93	90	86	92	91	87	82	86	84	77	73	89	87	81	74	84	82	77	73
Stikine	8,431	97	96	94	88	82	95	93	87	79	94	92	84	75	93	91	82	72	94	92	86	77
Ketchikan	7,251	93	92	91	85	79	92	91	83	76	91	89	79	68	91	88	77	67	92	89	80	70
Total	**20,857**	**95**	**94**	**93**	**87**	**82**	**93**	**92**	**85**	**79**	**91**	**89**	**81**	**72**	**91**	**89**	**80**	**71**	**91**	**89**	**82**	**74**

Source: Revision data base, QBRCA ALL, June 1991; FORPLAN analysis, June 1991; Doyle et al. (1988).

Appendix L contains habitat capability estimates for each of ADF&G's Wildlife Analysis Areas (WAA's) for 1954, 1990, and each Alternative for decades 1, 2, 5, and 15. A summary of the estimated changes in habitat capability for the WAA's is presented in Table 3-243.

About 152 WAA's have estimated goose nesting and brood rearing habitat capabilities. In 1990, 133 of these WAA's had habitat capabilities within 90 to 100 percent of 1954 levels, 17 WAA's had habitat capabilities between 75 to 89 percent of 1954 levels, and 2 WAA's had habitat capabilities between 50 to 74 percent of 1954 levels. Alternative A maintains higher habitat capabilities in more WAA's compared to the other alternatives, while Alternative D has the highest number of WAA's with habitat capabilities below 50 percent after 150 years.

Table 3-243

Summary of changes in Vancouver Canada Goose habitat capabilities for ADF&G's Wildlife Analysis Areas

Percent of 1954	No. of WAA's for 1990 and Decade 15 for Each Alt.					
Habitat Capability	1990	A-15	B-15	C-15	D-15	P-15
90-100 Percent	133	76	62	48	48	53
75-89 Percent	17	39	46	30	31	30
50-74 Percent	2	35	42	65	57	58
Less than 50 Percent	0	2	2	9	16	11

Source: Revision data base QBRCA ALL, June 1991; FORPLAN analysis, June 1991; Doyle et al., 1988.

The estimates of Vancouver Canada goose habitat capability presented above and in Appendix L underestimate the total habitat capability on the Tongass because several Wilderness areas do not have inventoried soils data in the Revision data base; the result is that habitat capability will be underestimated for those areas.

The estimated effects in Tables 3-242 and 3-243 do not include the effects of roads and associated human disturbance as described by Doyle, et al. (1988). However, Forest-wide and standards and guidelines have been developed to reduce human disturbance of geese and other waterfowl (see Waterfowl Standards and Guidelines in the Proposed Revised Plan, Wildlife Forest-wide Standards and Guidelines).

Moose

Table 3-244 displays land allocation patterns for the areas of the Forest with occupied moose habitat. For all alternatives, 35 percent of the area is within designated Wilderness/National Monuments. Alternative A has the highest percentage of land allocated to Natural Setting LUD's (51 percent); and Alternative C has the lowest percentage of land allocated to Natural Setting LUD's (42 percent). Both Wilderness and Natural Setting LUD's have no scheduled timber harvesting. The amount of occupied moose habitat which would be available for timber management ranges from 14 percent for Alternative A to 21 percent for Alternative C. Appendix L contains land allocation for each of ADF&G's WAA's within occupied moose habitat.

Moose habitat allocated to Wilderness and Natural Setting allocations is expected to gradually decline in habitat capability due to natural plant succession. Early-successional vegetation types (cottonwoods, willows, etc.) will gradually be replaced by conifer types which will provide less forage availability. Various techniques to help maintain early-successional communities, such as prescribed burning, has not shown to be cost effective to date.

Moose habitat allocated to moderate and intensive development allocations may have short-term increases in habitat capability due to increased forage for about the first 25 years following timber harvest. The short-term advantages of clearcutting may be offset by the longer period of reduced forage in the second-growth conifer forests. There is also concern that the second-growth conifer forests will not provide the quality of cover that old-growth forests can provide.

Alternative logging techniques which may have longer lasting benefits for moose habitat capability include: 1) Logging portions of moose habitat and keeping the logged areas in permanent early succession plant communities by periodic cutting or burning or some other treatment of the vegetation. This would result in a one-time harvesting of wood products from the logged areas. 2) Logging portions of moose habitat and then using the shortest possible timber rotations to reduce the amount of time logged areas are in second-growth conifer conditions. The intended result of this would be to have more acres in early-successional stages at any given time because of the shorter timber rotations. These ideas have not been fully modeled or tested to assess their feasibility or their effects on timber, other resources, and on moose habitat capability.

Table 3-244

Land Use Designation Groups within occupied Moose habitat for each alternative[1]

Moose Management Area	Alternative A I	M	N	W	Alternative B I	M	N	W	Alternative C I	M	N	W
Unuk/Chickman	0	0	0	767,973	0	0	0	767,973	0	0	0	767,973
Stikine River	0	0	1,342	318,616	0	0	1,342	318,616	0	962	381	18,616
South of Stikine River	7,122	58,065	182,037	0	18,163	41,768	187,294	0	73,367	76,515	97,342	0
Thomas Bay	17,004	48,344	314,255	130,187	16,755	92,818	270,031	130,187	95,873	42,071	241,658	130,187
Taku River	60	35,225	331,684	0	60	35,225	331,684	0	0	36,561	330,408	0
Berners Bay	0	0	565,778	0	0	0	565,778	0	0	0	565,778	0
Chilkat Range	1,518	152,478	118,055	97,409	1,618	181,204	89,229	97,409	100	213,171	58,780	97,409
Chilkat Valley	0	0	17,701	0	0	11,160	6,540	0	0	17,301	400	0
Yakutat Forelands & Nunatak Bench	0	601	637,660	305,023	0	641	637,620	305,023	600	600	637,060	305,023
Total	155,825	511,325	2,429,314	1,667,043	250,334	567,137	2,238,993	1,667,043	435,576	623,577	1,997,310	1,667,043
Percent	3	11	51	35	5	12	47	35	9	13	42	35

Moose Management Area	Alternative D I	M	N	W	Alternative P I	M	N	W
Stikine River	0	0	1,342	318,6160	0	1,342	318,616	
South of Stikine River	54,692	7,641	184,891	0	28,201	75,755	143,269	0
Thomas Bay	110,611	18,629	250,364	130,187	46,645	93,794	239,165	130,187
Taku River	439	38,319	328,210	0	0	36,561	330,408	0
Berners Bay	0	0	565,778	0	0	0	565,778	0
Chilkat Range	7,122	142,179	122,749	97,409	100	210,007	61,944	97,409
Chilkat Valley	0	40	7,661	0	0	17,301	400	0
Yakutat Forelands & Nunatak Bench	1,324	560	636,377	305,023	600	40	637,620	305,023
Total	566,309	312,223	2,177,932	1,667,043	323,925	665,440	2,067,102	1,667,043
Percent	12	7	46	35	7	14	43	35

Source: Revision data base, Q260WAA, June 1991.

[1] The land use designation groups are: I=Intensive Development; M=Moderate Development; N=Natural Setting; W=Wilderness

Wildlife Habitats on Adjacent Private Lands within the Planning Area

State and Private Lands

There are about 887,140 acres of State and Private lands adjacent to the Tongass National Forest (Table 3-245). About 714,895 acres (80 percent) are considered productive or commercial forested lands. About 65 percent (464,670 acres) of the productive or commercial forested lands have been harvested as of 1990. Future plans include harvesting an additional 32,975 acres this decade. Appendix L contains information on the acres of State and Private lands within each of ADF&G's WAA's.

Past and projected timber harvesting, from State and Private lands will remove 70 percent of the productive old growth which provided habitat for old-growth-associated wildlife species.

Table 3-245

State and Private lands adjacent to the three Administrative Areas of the Tongass National Forest

Administrative Area	Total S&P Acres	Estimated Productive Forested Land (Ac.)	Acres Harvested	Projected Future Harvest (Ac.)
Chatham	273,937	170,332	125,930	11,000
Stikine	111,437	100,576	76,047	550
Ketchikan	501,402	443,940	262,693	21,425
Total	**887,140**	**714,895**	**464,670**	**32,975**

Source: USDA Forest Service, State & Private Forestry, May 1991

Glacier Bay National Park

Glacier Bay National Park lies between the Yakutat area on the northwest end of the Forest and the Chilkat Mountains along the west side of Lynn Canal. Due to the relatively recent receding of glaciers, the Park vegetation represents some of the early primary plant succession and younger conifer forests within Southeast Alaska. The Park has been designated a Biosphere Reserve (along with the Kootznoowoo Wilderness Area on Admiralty Island) as part of the IUCN (International Union for the Conservation of Nature) Biosphere Reserve Program. General information on the status of the wildlife MIS within the Park follows (Planning Records, August 1989).

Red Squirrels. Red squirrels are abundant throughout the spruce and hemlock forests. They are also found in younger vegetational communities that are dominated by alder.

Marten. Marten are considered common and have been seen regularly not only in the older forests near Bartlett Cove, but in a variety of habitat types throughout the park (marten were recorded at every survey location during the last winter wildlife surveys in the Park).

Mountain Goats. A July 1985 survey counted a minimum of 759 mountain goats.

Brown Bear. Brown bear are present, but no reliable population estimates exist. Observations by Park Service employees suggest that the bears prefer the open country associated with the more recently uncovered barrens in the upper bay.

Black Bear. Black bear are considered more abundant than brown bears; however, no reliable population estimates exist.

Hairy Woodpeckers and Red-breasted Sapsuckers. These species are considered rare, but observations are made during the breeding bird surveys conducted in the Park. Two hairy woodpecker pairs have been documented nesting near Bartlett Cove in a 200 year-old spruce hemlock forest.

Brown Creepers. Brown Creepers are considered rare.

Bald Eagles. Bald eagle nesting occurs in the Park. No data was made available on the number of nests. A U.S. Fish and Wildlife survey conducted in the early 1980's found that 80 percent of the nests were in conifers, 15 percent in cottonwood trees, and about 5 percent were on cliffs or small islands.

Sitka Black-tailed Deer. The only established population of deer occurs on Willoughby Island; no reliable population estimate exists. Deer on the island may have been transplanted there but no documentation exists.

Vancouver Canada Goose. Nesting of geese has been documented in the Park. There are large concentrations of molting geese within the Park, with an estimate of about 1,700 molting geese.

Gray Wolf. No reliable population estimates exist for wolves within the Park. Sightings of wolves have increased over recent years, and wolf numbers seem to be increasing along with an expanding moose population.

River Otter. River otter have been noted in almost every inlet in the bay portion of the Park.

Effects of Alternatives on Meeting Hunter Demand

Deer Hunting Demand

Table 3-181 in the affected environment section presented data on deer harvests, deer hunters, and deer hunter-days. From the early 1980's to the mid-1980's, there was an increasing trend in deer hunting. Since about 1986/87, there has been a decreasing trend in deer hunting activity. Because of the up then down trend in deer hunting, future demand was modeled as remaining at 1989 levels. Analysis of the capacity (capability) of the Forest to provide for deer hunting demands is evaluated using five different approaches.

Desired number of deer per hunter. In 1987-88, ADF&G conducted a deer hunter survey in Southeast Alaska. In that survey, they asked deer hunters how many deer they desired to harvest annually. Responses ranged widely between individual hunters and between communities, but on the average deer hunters indicated they wanted to harvest 4.2 deer annually. With about 10,100 deer hunters in Southeast Alaska, a total of 42,400 deer would need to be harvested annually. Assuming a 10 percent harvest rate applied to a residual population of deer (the post-winter deer population prior to fawning) (Flynn and Suring 1988), deer habitat capability on the Forest would need to be at least 424,000 deer. The 1954 deer habitat capability on the Forest is estimated to have been about 287,000 animals. Therefore, the Forest has never had the capacity to meet the desired demand of deer hunters.

During the 1980's, a variety of deer seasons and bag limits have been allowed for deer hunters, ranging from closed seasons to antlered deer only to either sex, with bag limits of from two to six deer in the areas open to hunting. Game Management Unit 4, which encompasses Admiralty, Baranof and Chichagof Islands, has had the longest seasons (ranging from 122 to 184 days), either-sex hunting, and bag limits from three to six animals, depending on the particular area. A review of ADF&G hunting data for Game Management Unit 4 indicates that

the average number of deer harvested per hunter has been in the range of two for some areas, as high as three in some areas, and in some areas less than one. Even in portions of the Forest where hunting seasons allowed deer hunters to achieve their desired level of harvest, it appears that the average hunter does not have the ability to achieve that level of harvest.

Number of deer to satisfy each hunter. As part of the same 1987-88 ADF&G deer hunter survey, hunters were asked how many harvested deer would constitute a successful or satisfied deer hunting season. Again, responses ranged widely between individual hunters and between communities; but on the average deer hunters indicated they would be satisfied with a harvest of 2.7 deer annually. With about 10,100 deer hunters in Southeast Alaska, a total of 27,300 deer would need to be harvested annually. Assuming a 10 percent harvest rate applied to a residual population of deer (the post winter deer population prior to fawning) (Flynn and Suring, 1988), deer habitat capability on the Forest would need to be at least 273,000 deer. The 1954 deer habitat capability on the Forest is estimated to have been about 287,000 animals. To meet the satisfaction demand of deer hunters, habitat capability Forest-wide would need to be maintained at 95 percent of 1954 habitat capabilities.

Deer harvest data from the 1980's indicates that on the average Forest-wide, deer hunters have been unable to achieve the satisfaction level of harvest, even with deer hunting seasons which legally allow for that level of harvest. Deer harvest per hunter in some WAA's has met this satisfaction demand in a particular year.

Alaska Department of Fish and Game Draft Deer Population Objectives. ADF&G has been in the process of developing a strategic plan for the management of deer in Southeast Alaska. A final plan has not been completed as yet. In the draft plan, deer population objectives for the WAA's range from maintaining deer habitat at 100 percent of 1954 levels to 75 percent of 1954 levels. Table 3-246 shows how the list of WAA's which are estimated to decline below 75 percent of 1954 habitat capabilities for each alternative would change after 10 years; after 150 years. One-hundred sixty-one (161) WAA's contain suitable habitat for deer. Four WAA's, in 1990, have less than 75 percent of 1954 habitat capability. After 10 years, the Alternatives A, B, C, D, and P would have 15, 16, 26, 25, and 17 WAA's respectively with less than 75 percent of 1954 habitat capability. After 150 years, the alternatives would have 56, 68, 82, 76, and 80 WAA's respectively with less than 75 percent of 1954 habitat capability.

Table 3-246

Wildlife Analysis Areas (WAA's) with less than 75 percent of 1954 Deer Habitat Capability after 10 and 150 Years by Alternative

	Alternative									
WAA	A-1	A-15	B-1	B-15	C-1	C-15	D-1	D-15	P-1	P-15
405		X		X		X		X		X
406		X		X		X		X		X
509		X		X		X		X		X
510[1]	X	X	X	X	X	X	X	X	X	X
612		X		X		X		X		X
614		X		X		X		X		X
901		X		X		X		X		X
1003	X	X	X	X	X	X	X	X		X
1105		X				X		X		X
1106				X		X		X		
1210				X		X		X		X
1211		X		X		X		X		X
1212						X				
1213						X				X
1214		X		X		X		X		X
1315	X	X	X	X	X	X	X	X	X	X
1317	X	X	X	X	X	X	X	X	X	X
1318		X		X		X		X		X
1319		X		X		X		X		X
1332		X		X		X		X		X
1420		X	X	X	X	X	X	X	X	X
1421		X		X		X		X		X
1422	X	X	X	X	X	X	X	X		X
1525	X	X	X	X	X	X	X	X	X	X
1527	X	X		X		X		X	X	X
1528		X		X		X		X		X
1529		X		X		X		X	X	X
1530[1]	X	X	X	X	X	X	X	X	X	X
1531	X	X	X	X	X	X	X	X	X	X
1601		X		X		X		X		X
1603		X		X		X		X		X
1605		X		X		X		X		X
1810		X		X		X		X		X
1811						X		X		X
1813[1]	X	X	X	X	X	X	X	X	X	X
1816		X		X		X		X		X
1817						X				X
1901		X		X		X		X		X
1902		X		X		X		X		X
1903		X		X		X		X		X
1904	X	X	X	X	X	X	X	X	X	X
1905		X		X		X		X		X
1906	X	X		X		X		X		X
2007		X		X		X		X		X
2008				X		X		X		X
2202			X	X	X	X				

Table 3-246 (continued)

	Alternative									
WAA	A-1	A-15	B-1	B-15	C-1	C-15	D-1	D-15	P-1	P-15
2305		X		X		X		X		X
2306		X		X		X		X		X
2823	X	X	X	X	X	X	X	X		X
2926				X		X		X		X
2927						X				X
3001				X	X	X	X	X		
3002		X		X	X	X	X	X		X
3003				X	X	X	X	X		X
3104					X	X	X	X		X
3308	X	X	X	X	X	X	X	X		X
3311						X	X	X		X
3312						X	X	X		X
3313[1]	X	X	X	X	X	X	X	X		X
3314					X	X	X	X	X	X
3315		X	X	X	X	X		X		X
3523						X		X		X
3524		X		X		X		X		X
3525		X		X		X	X	X	X	X
3526		X		X	X	X	X	X	X	X
3551		X		X		X		X	X	X
3627		X		X	X	X		X		X
3629								X		X
3630				X		X		X		X
3731		X		X	X	X		X		X
3835				X		X				X
3836						X		X		X
4222						X				
4252				X		X		X		X
4253				X		X		X	X	X
5012		X		X	X	X	X	X		X
5014		X		X		X		X		X
5130						X		X		X
5131				X		X		X		X
5132		X		X	X	X	X	X	X	X
5133				X		X		X		X
5134				X		X		X		X
5135				X		X				X
5136		X				X		X		X
5138		X		X		X		X		X

Source: Alaska Department of Fish and Game.

[1] WAA's that have less than 75 percent of 1954 habitat capability in 1990.

Actual harvest rates in each WAA compared to estimated habitat capabilities. ADF&G has only collected deer harvest data for individual WAA's since 1987. The average number of deer harvested in each WAA for the 1987 to 1989 deer hunting seasons was compared to the estimated habitat capability for that WAA in 1954, 1990, and each alternative for the 1st, 2nd,

5th and 15th decades. Flynn and Suring (1988) indicated that the deer habitat capability model represented high density deer populations near the carrying capacity of the habitat, and recommended using a 10 percent harvest rate on the residual deer population (the residual deer population is the winter habitat capability estimated by the Sitka black-tailed deer habitat capability model). Comparing the current deer harvests with the estimated deer habitat capabilities and the recommended 10 percent harvest rate, it was possible to identify the WAA's which would not be able to support the existing harvest rates in the future for each alternative. Table 3-247 displays these WAA's. Even with 1954 habitat conditions, current harvest rates exceed the 10 percent level recommended by Flynn and Suring (1988) in 31 WAA's. As timber harvesting occurs in various WAA's according to the land allocations and objectives of each of the alternatives, the current deer harvest rates exceed the 10 percent level in additional WAA's. Using the recommended 10 percent harvest and the average number of deer harvested during the past 3 years, Table 3-247 provides a list of WAA's which may need to have reduced deer harvesting in the future. Other WAA's not listed in the table would be able to sustain or increase the current deer harvest levels.

Additional analysis of the deer harvesting which has been occuring in some of the WAA's during the 1980's suggests that using a 10 percent harvest rate greatly underestimates the harvest rates which deer populations can sustain, especially in areas without wolves. For example: WAA's 3001, 3002, and 3003 are on Baranof Island, adjacent to the town of Sitka. During the 1980's, the annual harvest rates have ranged from 12 percent of the 1954 habitat capability in the early 1980's to 34 percent of the 1954 habitat capability in 1987. These three WAA's accounted for 13 percent of the entire deer harvest in Southeast Alaska during the 1980 to 1989 period. WAA 2722 is Douglas Island, adjacent to the towns of Juneau and Douglas; during the 1980's the annual harvest rates have ranged from 13 percent to 48 percent of the 1954 habitat capability. WAA's 2621 and 2620 are Shelter and Lincoln Islands; during the 1980's the annual harvest rates have ranged from 20 percent to 64 percent of the 1954 habitat capability. Flynn and Suring (1988) indicated that a residual deer population substantially below carrying capacity might provide a sustainable harvest from 17-24 percent. Given the fact that many WAA's have sustained harvests through an entire decade above the 10 percent level, perhaps the habitat capability estimates represent deer populations substantially below carrying capacity and higher harvest rates should be used to predict future harvest capabilities.

Table 3-247

WAA's which cannot sustain current deer harvest levels assuming a 10 percent harvest rate on the residual (winter) deer population

1954	1990	A-1	A-2	A-5	A-15	B-1	B-2	B-5	B-15	C-1	C-2	C-5	C-15	D-1	D-2	D-5	D-15	P-1	P-2	P-5	P-15
3002	3002	3002	3002	3002	3002	3002	3002	3002	3002	3002	3002	3002	3524	3002	3002	3002	3002	3002	3002	3002	3524
2621	2621	3312	3312	3312	1420	3312	3312	3312	1420	3312	3312	3312	3002	3312	2621	2621	1420	3312	3312	3524	3002
2722	2722	2621	2621	3524	3524	2621	2621	3524	3524	2621	3003	3524	1420	2621	3312	3312	2621	3524	3524	3312	1420
3312	3312	2722	2722	2621	3312	2722	2722	2621	3312	3003	2621	3003	3312	3003	2620	2620	3312	2621	2621	2621	1318
3524	3524	3524	3524	2722	1318	3524	3524	2722	1318	2722	2722	2621	1318	2722	3003	3524	1904	2722	2722	2722	3312
2620	2620	2620	2620	1318	2621	3003	3003	3003	4252	3001	3524	2722	4252	2620	2722	3003	3524	3003	3003	1318	3835
3003	3003	3003	3003	3003	2722	2620	2620	1318	2621	3524	3001	4252	3003	3001	3001	2722	4252	3835	3835	4252	4252
4147	4147	4147	3835	1420	3003	3835	3835	1420	2722	2620	2620	3001	3835	3524	3524	1420	2620	2620	2620	3835	3003
3835	3310	3835	4147	2620	3835	3311	4252	4252	3003	3311	4252	1420	2722	3311	4252	4252	1318	4252	4252	3003	2722
4252	3835	3310	3310	3835	2620	4147	3311	2620	3835	4147	3311	3835	2621	4147	3311	3001	3003	3311	3311	1420	2621
3310	4252	4252	4252	4147	4147	3310	4147	3835	2620	3310	4147	3311	3001	3835	3835	3311	1421	3001	3001	3311	3836
4150	3001	3001	3001	3310	3310	3001	3310	3311	3311	3835	3835	2620	3836	3310	4147	3835	2722	4147	4147	2620	3311
3311	3311	3311	3311	3001	3001	4252	3001	4147	3001	4252	3310	1318	3311	4252	3310	3731	3001	3310	3310	3001	2620
3420	4150	4150	4150	4252	4252	4150	4150	3001	4147	4150	4150	4147	2620	4150	3836	1318	3311	3836	3836	4147	3001
3001	3420	3420	3420	3311	3311	3420	1420	3310	3310	3731	3731	3310	1421	3731	4150	4147	3835	4150	4150	3836	4147
1318	1318	1318	1318	4150	4150	3731	3420	4150	1421	3420	1420	3836	1904	3206	3731	3310	3731	3420	1420	3310	3310
3836	3836	3836	3731	3420	3731	1318	3731	3731	4150	1318	3420	3731	4147	3420	3206	3836	1003	1318	3420	4150	1904
3206	3206	3731	3836	3731	3420	3836	1318	3420	3731	3836	1318	4150	1528	1318	3420	1904	3836	3309	1318	3629	3629
3309	3731	3206	1420	3836	3315	3315	3836	3315	3420	3309	3309	3420	3731	3836	1904	3315	1422	1420	3309	3420	1528
3207	3309	1420	3206	3315	3309	3206	3315	3836	3315	3315	3836	3309	3310	1420	1318	4150	1906	3731	3731	3731	1421
3731	3207	3309	3315	3206	3836	3309	3309	3309	3309	3206	3315	3315	4150	3309	1420	1421	3315	3629	3629	3309	4150
3419	3419	3315	3309	3309	1421	1420	3206	3206	3836	3419	3206	1421	1319	3207	3309	1106	1528	3206	3315	3315	3315
4146	1420	3207	3207	3207	1904	3207	3207	1421	1528	1420	3419	1904	3315	3419	3315	3206	1106	3207	3206	1904	3420
1528	4146	3419	3419	3419	3206	3419	3419	3207	3206	3207	3207	1528	3420	3315	3207	3420	4147	3419	3207	3206	3309
3629	1528	4146	4146	3313	3313	4146	4146	3419	3313	3313	3104	3206	3309	1904	3419	3313	3310	3315	3419	1421	1422
3315	1904	1528	1904	1904	1528	1528	1904	3313	3629	4146	3313	3104	1527	4146	4146	3309	1527	4146	1904	1528	3731
4148	3629	1904	1528	4146	3207	1904	1528	1904	1904	3104	1904	3419	3313	3104	3104	1528	4150	1528	1528	3207	3313
3939	3315	3629	3629	1528	3419	3629	3629	1528	1422	3629	3629	3313	3104	1528	1528	3207	3313	1904	4146	3313	3206
3104	4148	3104	3104	1421	3629	3104	3104	4146	3207	1528	4146	3207	1422	3629	3629	3419	3309	3104	3104	3419	3104
4145	3104	4148	4148	3629	4146	4148	4148	3629	3419	1904	1528	3629	3206	2517	3313	1422	3206	3313	3313	3104	1527
1904	3939	3313	3313	3104	1530	3313	3313	3104	4146	4148	3630	4146	3419	3313	2517	4146	3420	4148	4148	4146	3207
	4145	3939	3939	4148	1422	3939	3939	4148	1530	3939	1421	1319	3207	4148	1421	3630	1530	3939	3939	1422	3419
	1421	4145	1421	3939	1527	2517	1421	3939	1527	2517	4148	3630	3629	3939	4148	3629	3629	2517	1421	3630	1319
		2517	4145	1527	3627	4145	2517	2517	1529	4145	3939	1422	1529	3630	3939	3104	3630	1421	3630	4148	1529
			2517	1422	3104		4145	1422	1319	1421	2517	2517	1530	4145	3630	1527	3207	4145	2517	3939	1530
				4145	1529		1422	1106	3104	3630	1422	4148	4146	1421	1106	2517	3419	1527	4145	1527	3630
				2517	4148			1527	3627	3627	3627	1527	3630		4145	4148	3104		3627	3526	4146
				3627	3939			1319	1106		4145	3939	3627		1422	3939	4146		1527	1319	3526
					1319			4145	2517		1527	1106	1003		1527	3627	2517			3627	3627
					3308			3627	4148			3627	3551			4145	3308			2517	1003
					2517			3630	3939			4145	3308			1319	3627			1529	3551
					1003			1529	3308			1529	1317			3526	1319			4145	3308
					4145				3630			3308	1106				1214				1317
									1003				2517				3526				4148
									4145				148				529				3939
									4253				3939				1525				1214
													1214				3551				1315
													1315				1315				2517
													3526				4253				4145
													4145				1317				407
													407				4148				
													4253				3939				
																	1211				
																	4145				

The 1980's deer hunting data collected by ADF&G. Data on the actual deer hunting which occurred during the 1980's probably represents what could be expected in any decade. Using an entire decade includes the many factors which influence deer numbers and hunting activity, including weather patterns, access, economic conditions, habitat capability and hunting success. For the period 1980 through 1989 (excluding 1981), the number of deer killed, the total number of hunter-days, and the average number of hunter-days to harvest a deer was calculated for each of ADF&G's Game Management Units (GMU's). For GMU 3 which had no deer harvests in a large portion of its area, 1960's deer harvest data was used for number of deer killed; there was no data available on the number of hunter-days expended in the 1960's, so we used the number of hunter-days data from the portion of GMU 3 which was open to hunting during the 1980's was used. The average number of hunter-days to harvest a deer was then applied to the estimate of how many deer could be harvested annually based on the estimated winter deer habitat capabilities for each alternative. The two estimates for how many deer can be harvested annually were: 1) 10 percent of the residual (winter) deer population Forest-wide, as recommended by Flynn and Suring (1988); 2) 20 percent of the residual (winter) deer population for the portions of the Forest without wolves, and 10 percent of the residual (winter) deer populations for the portions of the Forest with wolves.

Table 3-248 displays the results of this analysis. For ADF&G Game Management Units 1A, 1B, 2, and 3, capacity exceeds the demand in all alternatives and decades. In Game Management Units 1C and 4, demand exceeds capacity in the 5th and 15 decades for Alternatives B, C, D, and P, when a 10 percent harvest rate is used. When a 20 percent harvest rate is used for Unit 4, capacity exceeds demand for all alternatives in all decades.

Table 3-248

Comparison of Sitka Black-Tailed Deer hunter-day capacity with estimated demand

			Alternative and Decade			
	1954	1990	A1	A2	A5	A15
GMU 1A Capacity (10%)[1]	30,417	29,072	28,943	28,522	28,154	25,595
Demand	4,251	4,251	4,251	4,251	4,251	4,251
GMU 2 Capacity (10%)	47,448	42,139	40,251	38,860	33,866	29,800
Demand	12,292	12,292	12,292	12,292	12,292	12,292
GMU 1B Capacity (10%)	13,830	13,268	12,892	12,696	11,861	10,916
Demand	1,097	1,097	1,097	1,097	1,097	1,097
GMU 3 Capacity (10%)	48,363	45,150	44,044	42,722	39,181	35,354
Demand[1]	11,791	11,791	11,791	11,791	11,791	11,791
GMU 1C Capacity (10%)	3,313	3,247	3,182	3,152	3,015	2,924
Demand	2,898	2,898	2,898	2,898	2,898	2,898
GMU 4 Capacity (10%) (10%)	27,150	25,810	25,237	25,092	24,495	23,731
Demand	23,420	23,420	23,420	23,420	23,420	23,420
GMU 4 Capacity (20%)[2]	54,300	51,620	50,474	50,183	48,989	47,462
Demand	23,420	23,420	23,420	23,420	23,420	23,420

Table 3-248 (continued)

	Alternative and Decade				Alternative and Decade			
	B1	B2	B5	B15	C1	C2	C5	C15
GMU 1A Capacity (10%)	28,871	28,716	28,087	25,284	28,783	28,534	27,729	23,625
Demand	4,251	4,251	4,251	4,251	4,251	4,251	4,251	4,251
GMU 2 Capacity (10%)	40,323	38,510	33,405	28,969	39,428	36,740	29,295	23,474
Demand	12,292	12,292	12,292	12,292	12,292	12,292	12,292	12,292
GMU 1B Capacity (10%)	13,000	12,925	11,900	10,639	13,002	12,946	11,466	9,304
Demand	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097
GMU 3 Capacity (10%)	43,738	42,285	38,237	33,167	43,090	41,203	36,276	30,662
Demand[1]	11,791	11,791	11,791	11,791	11,791	11,791	11,791	11,791
GMU 1C Capacity (10%)	3,134	3,111	2,922	2,701	3,087	3,064	2,561	2,380
Demand	2,898	2,898	2,898	2,898	2,898	2,898	2,898	2,898
GMU 4 Capacity (10%)	24,986	24,733	23,985	23,051	23,861	23,251	22,508	21,411
Demand	23,420	23,420	23,420	23,420	23,420	23,420	23,420	23,420
GMU 4 Capacity (20%)	49,972	49,466	47,969	46,102	47,723	46,501	45,017	42,822
Demand	23,420	23,420	23,420	23,420	23,420	23,420	23,420	23,420

	Alternative and Decade				Alternative and Decade			
	D1	D2	D5	D15	P1	P2	P5	P15
GMU 1A Capacity (10%)	28,578	28,115	27,814	23,765	28,820	28,500	27,962	23,816
Demand	4,251	4,251	4,251	4,251	4,251	4,251	4,251	4,251
GMU 2 Capacity (10%)	39,016	36,131	27,945	21,664	40,386	37,670	30,560	25,478
Demand	12,292	12,292	12,292	12,292	12,292	12,292	12,292	12,292
GMU 1B Capacity (10%)	12,808	12,768	11,421	9,724	12,951	12,845	11,437	9,228
Demand	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097
GMU 3 Capacity (10%)	42,521	40,349	34,392	27,590	43,442	41,840	37,476	32,931
Demand[1]	11,791	11,791	11,791	11,791	11,791	11,791	11,791	11,791
GMU 1C Capacity (10%)	3,116	3,047	2,750	2,492	3,135	3,043	2,621	2,450
Demand	2,898	2,898	2,898	2,898	2,898	2,898	2,898	2,898
GMU 4 Capacity (10%)	23,988	23,503	22,509	21,170	23,903	23,457	22,817	21,674
Demand	23,420	23,420	23,420	23,420	23,420	23,420	23,420	23,420
GMU 4 Capacity (20%)	47,977	47,005	45,017	42,341	47,807	46,915	45,633	43,348
Demand	23,420	23,420	23,420	23,420	23,420	23,420	23,420	23,420

Demand assumes an annual harvest of 2,071 deer from GMU 3 based on historical hunting data from the 1960's, with an average of 5.7 hunter-days/deer

[1] Capacity based on a 10 percent deer harvest rate.

[2] Capacity based on a 20 percent deer harvest rate.

Brown Bear Hunting Demand

The approach used in evaluating the capability of the Forest to provide for future brown bear hunting demand used the actual brown bear hunting activity data collected by the Alaska Department of Fish and Game during the 1980's. The actual brown bear hunting data which occurred during the 1980's probably represents what could be expected in any decade. Using an entire decade includes the many factors which influence brown bear numbers and hunting activity, including weather patterns, access, habitat capability and hunting success. During the 1980's brown bear hunting activity generally increased from the early 1980's to about 1987, and since then has declined. Future demand was estimated as the average which occurred during the 1980's. For the period 1980 through 1989, the number of brown bear killed, the total number of successful hunter-days, and the average number of successful hunter-days to harvest a brown bear was calculated for each of ADF&G's Game Management Units (GMU's). The average number of successful hunter-days to harvest a brown bear was then applied to the estimate of how many brown bear could be harvested annually based on the estimated brown bear habitat capabilities for each alternative (a four percent harvest rate was used). Tables 3-249 and 3-250 display the results of this analysis.

Estimated brown bear habitat capabilities for GMU's 1A, 1B, 1C, 1D and 4 are expected to meet demand in all alternatives and for all decades. There may be individual WAA's within each GMU that because of access may receive more hunting pressure than the habitat capability can support, and hunting regulations will need to address this.

Brown bear hunting demand exceeds the habitat capability in all alternatives and decades, and even the 1990 and 1954 estimate of habitat capability in GMU 5A. If the estimate of habitat capability for GMU 5A is accurate, brown bear hunting activity should be reduced.

Table 3-249

Comparison of Brown Bear hunter-day capacities and estimated Brown Bear hunting demand[1]

			Alternative and Decade			
	1954	1990	A1	A2	A5	A15
GMU 1A Capacity	109	109	109	109	109	108
Demand	12	12	12	12	12	12
GMU 1B Capacity	62	61	60	60	59	58
Demand	15	15	15	15	15	15
GMU 1C Capacity	43	43	42	42	41	41
Demand	10	10	10	10	10	10
GMU 4 Capacity	793	777	769	766	757	746
Demand	390	390	390	390	390	390
GMU 1D Capacity	7	6	6	6	6	6
Demand	1	1	1	1	1	1
GMU 5A Capacity	47	46	46	46	46	46
Demand	99	99	99	99	99	99

Table 3-249 (continued)

	Alternative and Decade				Alternative and Decade			
	B1	B2	B5	B15	C1	C2	C5	C15
GMU 1A Capacity	109	109	109	108	109	109	109	106
Demand	12	12	12	12	12	12	12	12
GMU 1B Capacity	60	60	59	57	60	60	59	56
Demand	15	15	15	15	15	15	15	15
GMU 1C Capacity	42	42	41	41	41	41	40	40
Demand	10	10	10	10	10	10	10	10
GMU 4 Capacity	767	762	750	736	752	744	728	715
Demand	390	390	390	390	390	390	390	390
GMU 1D Capacity	6	6	6	6	6	6	6	6
Demand	1	1	1	1	1	1	1	1
GMU 5A Capacity	46	46	46	46	46	46	46	45
Demand	99	99	99	99	99	99	99	99

	Alternative and Decade				Alternative and Decade			
	D1	D2	D5	D15	P1	P2	P5	P15
GMU 1A Capacity	109	109	109	107	109	109	109	106
Demand	12	12	12	12	12	12	12	12
GMU 1B Capacity	60	60	59	57	60	60	59	56
Demand	15	15	15	15	15	15	15	15
GMU 1C Capacity	41	41	40	39	41	41	40	40
Demand	10	10	10	10	10	10	10	10
GMU 4 Capacity	754	747	729	709	749	742	730	716
Demand	390	390	390	390	390	390	390	390
GMU 1D Capacity	6	6	6	6	6	6	6	6
Demand	1	1	1	1	1	1	1	1
GMU 5A Capacity	46	46	46	45	46	46	46	45
Demand	99	99	99	99	99	99	99	99

[1] Capacity is based on vegetative characteristics only.

Table 3-250

Comparison of Brown Bear hunter-day capacities and estimated Brown Bear hunting demand[1]

	1990	A15	B15	C15	D15	P15
GMU 1A Capacity	108	106	106	103	104	103
Demand	12	12	12	12	12	12
GMU 1B Capacity	59	53	52	47	51	49
Demand	15	15	15	15	15	15
GMU 1C Capacity	42	38	37	35	35	35
Demand	10	10	10	10	10	10
GMU 4 Capacity	732	678	653	609	596	616
Demand	390	390	390	390	390	390
GMU 1D Capacity	6	6	6	5	6	5
Demand	1	1	1	1	1	1
GMU 5A Capacity	46	46	45	43	44	44
Demand	99	99	99	99	99	99

[1] Capacity includes vegetative characteristics plus effects of towns, cabins, campgrounds, and roads for 1990 and decade 15 for each alternative.

Black Bear Hunting Demand

The approach used in evaluating the capability of the Forest to provide for future black bear hunting demand was to use the actual black bear hunting activity data collected by the Alaska Department of Fish and Game during the 1980's. The actual black bear hunting data which occurred during the 1980's probably represents what could be expected in any decade. Using an entire decade includes the many factors which influence black bear numbers and hunting activity, including weather patterns, access, habitat capability, economic conditions, hunting success, etc. During the 1980's black bear hunting activity steadily increased. Future demand was estimated to be 27 percent higher than occurred at the end of the decade. For the period 1980 through 1989, the number of black bear killed, the total number of successful hunter-days, and the average number of successful hunter-days to harvest a black bear was calculated for each of ADF&G's Game Management Units (GMU's). The average number of successful hunter-days to harvest a black bear was then applied to the estimate of how many black bear could be harvested annually based on the estimated black bear habitat capabilities for each alternative (a seven percent harvest rate was used). Tables 3-251 and 3-252 display the results of this analysis.

Estimated black bear habitat capabilities for GMU's 1A, 1B, 1D and 5A are expected to meet demand in all alternatives and for all decades. There may be individual WAA's within each GMU that, because of access, may receive more hunting pressure than the habitat capability can support, and hunting regulations will need to address this.

For GMU's 2 and 3, black bear hunting demand exceeds the habitat capability in all alternatives and decades, and even the 1990 and 1954 estimates of habitat capability. If the estimates of habitat capabilities for GMU's 2 and 3 are accurate, black bear hunting activity should be reduced.

Table 3-251

Comparison of Black Bear hunter-day capacity and estimated Black Bear hunting demand[1]

	1954	1990	A1	A2	A5	A15
			Alternative and Decade			
GMU 1A Capacity	846	839	837	835	829	802
Demand	193	193	193	193	193	193
GMU 2 Capacity	705	668	663	645	582	533
Demand	808	808	808	808	808	808
GMU 1B Capacity	262	259	258	256	250	241
Demand	116	116	116	116	116	116
GMU 3 Capacity	759	748	745	732	689	621
Demand	1,012	1,012	1,012	1,012	1,012	1,012
GMU 1C Capacity	395	394	385	384	377	368
Demand	392	392	392	392	392	392
GMU 1D Capacity	10	10	10	10	10	10
Demand	2	2	2	2	2	2
GMU 5A Capacity	171	170	171	171	168	168
Demand	76	76	76	76	76	76

	Alternative and Decade				Alternative and Decade			
	B1	B2	B5	B15	C1	C2	C5	C15
GMU 1A Capacity	838	835	831	800	839	833	827	776
Demand	193	193	193	193	193	193	193	193
GMU 2 Capacity	667	647	576	518	658	632	533	463
Demand	808	808	808	808	808	808	808	808
GMU 1B Capacity	258	257	250	239	258	257	247	227
Demand	116	116	116	116	116	116	116	116
GMU 3 Capacity	744	729	676	598	738	718	660	567
Demand	1,012	1,012	1,012	1,012	1,012	1,012	1,012	1,012
GMU 1C Capacity	383	382	373	360	365	364	351	339
Demand	392	392	392	392	392	392	392	392
GMU 1D Capacity	10	10	10	10	10	10	10	10
Demand	2	2	2	2	2	2	2	2
GMU 5A Capacity	169	168	164	163	169	169	166	154
Demand	76	76	76	76	76	76	76	76

Table 3-251 (continued)

	Alternative and Decade				Alternative and Decade			
	D1	D2	D5	D15	P1	P2	P5	P15
GMU 1A Capacity	837	831	825	780	839	835	827	780
Demand	193	193	193	193	193	193	193	193
GMU 2 Capacity	656	631	528	453	663	637	546	483
Demand	808	808	808	808	808	808	808	808
GMU 1B Capacity	258	257	248	232	258	256	247	227
Demand	116	116	116	116	116	116	116	116
GMU 3 Capacity	738	716	649	543	739	720	668	586
Demand	1,012	1,012	1,012	1,012	1,012	1,012	1,012	1,012
GMU 1C Capacity	377	377	365	347	366	364	349	337
Demand	392	392	392	392	392	392	392	392
GMU 5A Capacity	10	10	10	10	10	10	10	10
Demand	2	2	2	2	2	2	2	2
GMU 5A Capacity	169	165	163	158	169	169	168	156
Demand	76	76	76	76	76	76	76	76

[1] Capacity is based on vegetative conditions only in this table.

Table 3-252
Comparison of Black Bear hunter-day capacity and estimated Black Bear hunting demand[1]

	1990	A15	B15	C15	D15	P15
GMU 1A Capacity	826	781	776	747	753	751
Demand	193	193	193	193	193	193
GMU 2 Capacity	602	468	452	385	377	411
Demand	808	808	808	808	808	808
GMU 1B Capacity	252	227	224	206	216	208
Demand	116	116	116	116	116	116
GMU 3 Capacity	705	559	523	485	462	509
Demand	1,012	1,012	1,012	1,012	1,012	1,012
GMU 1C Capacity	393	355	344	316	327	314
Demand	392	392	392	392	392	392
GMU 1D Capacity	9	9	9	9	9	9
Demand	2	2	2	2	2	2
GMU 5A Capacity	168	166	160	151	155	153
Demand	76	76	76	76	76	76

[1] Capacity includes vegetative conditions plus effects of towns, cabins, campgrounds and roads for 1990 and decade 15 for each alternative.

Mountain Goat Hunting Demand

Under a potential maximum effects scenario, after 150 years, very little effect on goat habitat is predicted. Habitat capability after 150 years should be about 8,450. Using an estimated seven percent harvest rate, up to 590 goats could be harvested. However, goats are susceptible to disease and predation, therefore these factors are also of importance in determination of harvest rates in specific areas. Mountain goat hunting during the 1980's yielded an average annual harvest rate of 190 animals, or about two percent of the habitat capability. Therefore, no cumulative effect is anticipated on hunter demand for the 150 year analysis period under any alternative.

In the 1980's, WAA's 3001 and 3002 had hunter harvest rates exceeding seven percent of estimated habitat capability. Otherwise, harvest rates have generally been less than seven percent of the estimated habitat capability.

Moose Hunting Demand

The current estimated population of moose on the Tongass is about 1,900 animals. Hunting for moose is totally under a permit system that tightly controls moose harvest within ADF&G moose management areas. Because of the tightly controlled harvest, a demand estimate was not made. ADF&G's strategic moose plan documents 177 moose harvested in 1989 with an objective to increase the harvest to 231 per year by 1994. ADF&G has set a harvest rate objective of between eight and nine percent of the estimated number of animals. No cumulative adverse effects are anticipated under any alternative for moose habitat capability.

Timber harvest can provide short-term forage increases which can be beneficial to moose populations.

Marten Trapping Demand

ADF&G does not collect data for total number of trappers, nor the number of trapper-days associated with marten trapping. Data on the number of marten trapped in each WAA has only been collected since 1984, and ADF&G has only made 4 years (1984 through 1987) of this data available. To evaluate the effects of each alternative on marten trapping, the average number of marten harvested in each WAA for these four seasons was compared to the estimated fall population of marten in each WAA. During this period of time, the State of Alaska has had a marten trapping season, with been no limits on the number of trappers or on the number of marten harvested. The highest number of marten harvested occurred in 1987, and the lowest number of marten harvested occurred in the 1986 season. Because there have been no limits on number of trappers, we assume the four years of trapping data represent demands for marten. The following briefly summarizes the analysis steps:

1. The marten habitat capability model (Suring, et al., 1988) represents adult resident marten during the winter period. A large proportion of the marten harvest are juvenile animals (Strickland and Douglas, 1987); therefore, an estimate of the fall population compared to the winter resident adult population is needed to assess the total number of marten available for trapping. Several studies indicated the following changes in populations between winter and fall: a late winter resident adult population of 1.6 per sq. mile, with fall populations of 3.1 to 4.9 per sq. mile (Francis and Stephenson, 1972, reported in Strickland and Douglas, 1987); another study reported winter populations of 1.0 per sq. mile, with fall populations of 1.6 per sq. mile (Archibald and Jessup, 1984, reported in Strickland and Douglas, 1987). This represents population increases of between 160 percent and 300 percent between winter and fall. For this analysis, we used a population increase of 200 percent between winter and fall.

2. The estimated winter marten habitat capability was calculated for each WAA for 1954, 1990, and each alternative out to the 15th decade. The winter habitat capability was increased by 200 percent to estimated the fall marten population which would be available for trapping.

3. Using the 4 years of marten trapping data available for each WAA, an average marten harvest was calculated for each of the WAA's.

4. The proportion of a marten population that may be harvested on a sustained-yield basis has been estimated to be at least 40 percent (Quick, 1956; Suring, et al., 1988). Comparing the average marten harvest which occurred between 1984 to 1987 with the estimated fall marten population and the recommended 40 percent harvest rate, it was possible to identify the WAA's which would not be able to support the existing harvest rates in the future for each alternative.

Table 3-253 displays these WAA's. Even with 1954 habitat conditions, current harvest rates exceed the 40 percent harvest levels in 3 WAA's. As timber harvesting occurs in various WAA's according to the land allocations and objectives of each alternative, the current marten harvest rates exceed the 40 percent level in additional WAA's. Using the recommended 40 percent harvest rate and the average number of marten trapped during the 1984 to 1987 period, Table 3-253 provides a list of WAA's which may need to have reduced marten harvesting in the future. Other WAA's not listed in the table would be able to sustain or increase the current marten trapping levels.

Table 3-253

WAA's which cannot sustain current Marten harvest levels, assuming a 40 percent harvest rate on estimated fall marten populations, for 1954, 1990, and decade 15 for each alternative

1954	1990	A-15	B-15	C-15	D-15	P-15
3523	3523	3523	3523	3524	3523	3523
3524	3524	1318	1318	3523	1318	3524
1318	1318	3524	3524	1318	3524	1318
	1317	1420	1420	1317	1317	1317
		1317	1317	1420	1420	1420
		1211	1211	1527	1525	1527
		3627	3627	1211	1527	1211
		1527	1527	1525	1211	1525
		1525	1525	3627	3627	3627
				2202		2202
				613		613

River Otter Trapping Demand

ADF&G does not collect data for total number of trappers, or the number of trapper-days associated with river otter trapping. Data on the number of river otter trapped in each WAA was available from 1980 through 1987 (ADF&G). To evaluate the effects of each alternative on river otter trapping, the average number of river otter harvested in each WAA for the eight seasons (1980 through 1987) was compared to the estimated river otter habitat capability in each WAA. During this period of time, the State of Alaska has had a river otter trapping season, with no limits on the number of trappers or on the number of river otter harvested. The highest number of river otter harvested occurred in the season ending in 1980, and the lowest number of river otter harvested occurred in the season ending in 1987. Because there have been no limits on number of trappers, we assume the eight years of trapping data represent demand for river otters. The following briefly summarizes the analysis steps:

1. The river otter habitat capability model (Suring, et al., 1988) represents the number of river otters during the spring and early summer period, which includes juvenile otters (young of the year). We used the number of river otters estimated by the habitat capability model as an estimate of the number of otters which would be available for the following fall/winter trapping season.

2. The estimated river otter habitat capability was calculated for each WAA for 1954, 1990, and each alternative out to the 15th decade.

3. Using the eight years of river otter trapping data available for each WAA, an average river otter harvest was calculated for each of the WAA's.

4. The proportion of a river otter population that may be harvested on a sustained yield basis was estimated to be 40 percent (M.Orme, personal communication). Comparing the average river otter harvest which occurred between 1980 to 1987 with the estimated river otter population and the recommended 40 percent harvest rate, it was possible to identify the WAA's which would not be able to support the existing harvest rates in the future for each alternative.

Table 3-254 displays these WAA's. Average annual river otter harvest exceeds the 40 percent harvest rate in three WAA's even with 1954 habitat capability. However, two of these three WAA's (1318 and 408) include substantial private lands, and river otter habitat capability on the private land portions is not known. Records for timber harvesting on these private lands indicate that 100 percent of the commercial timber acres have been harvested (Appendix L). Alternatives A, B, C, and P are expected to maintain river otter habitat capabilities at existing levels, and average river otter harvest rates which occurred from 1980 to 1987 are expected to be sustained with these alternatives, except for the three WAA's listed in Table 3-254. Alternative D is expected to result in declines in river otter habitat capability; as a result of these declines, eight WAA's would not be able to sustain the average harvest rates which occurred from 1980 to 1987. Other WAA's not listed in the table would be able to sustain or increase the current river otter trapping levels.

Table 3-254

WAA's which cannot sustain current River Otter harvest levels, assuming a 40 percent harvest rate on estimated river otter populations, for 1954, 1990, and decade 15 for each alternative

1954	1990	A-15	B-15	C-15	D-15	P-15
1318	1318	1318	1318	1318	1106	1318
408	408	408	408	408	1906	408
1527	1527	1527	1527	1527	2621	1527
					1527	
					1318	
					1904	
					408	
					2008	

Gray Wolf Trapping/Hunting Demand

ADF&G does not collect data for total number of hunters/trappers, nor the number of hunter/trapper-days associated with wolf harvests. Data on the number of wolves harvested in each WAA was available from 1980 through 1987 from ADF&G. To evaluate the effects of each alternative on wolf harvesting, the average number of wolves harvested in each WAA for the 8 seasons (1980 through 1987) was compared to the estimated wolf habitat capability in each WAA. During this period of time, the State of Alaska has had a year-around harvest season for wolves, with no limit on the number of wolf hunters/trappers or on the number of wolves which can be harvested. The wolf harvest season ending in 1987 had the highest number of wolves harvested, but the year previous was the third lowest during the eight-year period. Because there has been no limit on wolf harvesting, we assume that the eight years of harvest data represent the demand for wolf harvesting. The following briefly summarizes the analysis steps:

1. The gray wolf habitat capability model (Suring, et al., 1988) was used to estimate the number of wolves available for harvesting in each WAA.

2. The estimated wolf habitat capability was calculated for each WAA for 1954, 1990, and each alternative out to the 15th decade.

3. Using the 8 years of wolf harvest data available for each WAA, an average wolf harvest was calculated for each of the WAA's. The number of wolves harvested in each WAA is

highly variable between years. All WAA's but two had at least one year during the eight when no wolves were harvested; the two WAA's, which were an exception to this, had years with just one wolf harvested. There are years when wolf harvests exceed the estimated habitat capability for the WAA's, sometimes by as much as 500 percent. One reason for this high variability is that wolf pack territories probably include more than one WAA. Combining several WAA's together to evaluate wolf populations and harvests would help to reduce the high variability, but we had no basis for combining WAA's in a way which would make sense to wolves.

4. The proportion of a wolf population that may be harvested on a sustained yield basis was estimated to be 50 percent (M.Orme, personal communication). Comparing the average wolf harvest which occurred between 1980 to 1987 with the estimated wolf population and the recommended 50 percent harvest rate, it was possible to identify the WAA's which would not be able to support the existing harvest rates in the future for each alternative.

Table 3-255 displays these WAA's. Average annual wolf harvest exceeds the 50 percent harvest rate in four WAA's even with 1954 habitat capability. However, two of these three WAA's (1106 and 407) include private lands, and wolf habitat capability on the private land portions is not known. Records for timber harvesting on these private lands indicate that 100 percent and 95 percent respectively, of the commercial timber acres have been harvested in these WAA's (Appendix L). Each alternative reduces wolf habitat capability in various WAA's; as this occurs, additional WAA's are not expected to maintain the existing average wolf harvests. Alternative D has the highest number of WAA's (12) which are not expected to maintain the existing average wolf harvests. Other WAA's not listed in the table would be able to sustain or increase the current wolf harvesting levels.

Table 3-255

WAA's which cannot sustain current Wolf harvest levels, assuming a 50 percent harvest rate on estimated wolf populations, for 1954, 1990, and decade 15 for each alternative

1954	1990	A-15	B-15	C-15	D-15	P-15
1106	1106	1106	1106	1106	1106	1106
2409	2409	2409	2409	2409	2409	2409
407	407	407	407	407	407	407
4503	4503	4503	4503	4503	4503	4503
	1420	1420	1420	1420	1420	1420
	2306	2306	2306	2306	2306	2306
	1605	1605	1605	1605	1605	1605
		1318	1318	1318	1318	1318
		405	405	405	405	405
				1528	1528	1528
				1317	1317	1317
					1315	

Habitat Improvement

Forest-wide Standards and Guidelines designed to maintain, enhance, or mitigate impacts on wildlife habitats and populations apply to all alternatives. Many of these have been presented previously. The full set of Forest-wide standards and guidelines is included in Chapter 4 of the Proposed Revised Forest Plan.

Table 3-256 displays potential mitigation or improvement projects for the first decade. About 13,000 acres and 364 structures have been identified as potential wildlife projects during the first decade. Beneficial effects of these projects have not been included in any of the previous environmental consequences analysis. The Forest and Region are currently monitoring and evaluating these types of projects to assess their effectiveness. The results of this monitoring will have an effect on how many acres are treated during implementation.

Table 3-256

Ten Year Wildlife Program

Type of Activity or Project	Chatham	Stikine	Ketchikan
Habitat Improvement (Acres/Year)			
Moose	500	400	500
Bear	6,400	0	0
Grouse	500	0	0
Waterfowl	50	100	50
Deer (second-growth management)	1,300	1,200	2,000
Habitat Improvement (Structures/Year)			
Waterfowl	60	20	10
Snags/Cavity Nesting	100	20	0
Bear	20	0	0
Mountain Goat	10	0	0
Moose	5	0	0
Bald Eagle	100	0	0
Eyes on Wildlife	4	5	10

Source: Planning records May 31, 1991 (Stikine Area); June 3, 1991 (Chatham Area); May 1991 (Ketchikan Area).

Economic Environment

Affected Environment and Environmental Consequences

Introduction

The affected environment and environmental consequences portions of the Economic Environment will be discussed together for each subsection. The subsections are: Employment and Income, Net Cash Flow and Payments to State, Economic Efficiency, and Resource Demand Analysis.

Forest planning focuses on resource-related issues and assesses the environmental, social and economic impact of alternative management choices. To make this assessment, the various components of the environment which are affected must be identified. This section of Chapter 3 describes the social and economic environment which is affected by management of the Tongass National Forest. Additional information on the subject was prepared in April, 1978, in cooperation with the University of Alaska. Further documentation can be found in the Socioeconomic Overview for the Tongass National Forest (contained in the Planning Records).

Nearly 80 percent of Alaska's panhandle is within the Tongass National Forest, an area larger than the State of West Virginia. This area stretches roughly 500 miles from Ketchikan in the southeast, to Yakutat in the northwest, and is mainly unpopulated wild country. Presently, only about 65,000 people live in 33 towns, communities and villages located in or very near the boundaries of this, the largest Forest in the National Forest System.

The economies of most communities in Southeast Alaska depend almost exclusively on the Tongass National Forest to provide natural resources for uses such as fishing, tourism, recreation, timber harvesting, mining and subsistence uses. There is very little private land to provide these resources. Consequently, maintaining the abundant natural resources found on the Tongass concern those who make their living here.

In addition to economic activity, the quality of people's lives is greatly enhanced by the physical environment associated with the Tongass. To many, Southeast Alaska is viewed as what America was like two hundred years ago. Alaska has always been known as a wild and magnificent place, a vast expanse of seemingly unlimited scenery and vast natural resources. People who live here and people who have never even seen Alaska think of it as "The Last Frontier." Many Southeast Alaskans want to keep that which makes their part of the world unique. At the same time, they want to continue maintaining their economic livelihood. With a limited resource base, resolution of this conflict is increasingly difficult.

A look at current and expected future conditions in areas influenced by the Tongass National Forest will be useful to project possible changes in social and economic sectors that would result from implementing an alternative.

Area of Influence

The area or zone of Tongass National Forest influence was established by identifying users of the Forest's resources. Major resources of the Tongass include recreation opportunities, fish and wildlife, timber, minerals, and water. Each resource is used, processed or consumed by different, though overlapping, segments of the population located in varying proximity to the Forest. The area for this analysis has been separated into a primary influence area and a secondary influence area.

The primary influence area for the Tongass National Forest is Southeast Alaska. Local residents make up 2.2 million of the 2.8 million recreation visitor days that occur annually on the Tongass. In 1988, fisheries provided about 3,400 jobs with earnings of nearly $74 million (unpublished report from Forest Service IPASS Model Analysis, December 1988). Rural Southeast Alaska residents harvest fish and wildlife resources for subsistence purposes. Most of the timber sold from the Tongass National Forest is processed by mills in Southeast Alaska. The largest silver mine in North America is on Admiralty Island at Greens Creek in Southeast Alaska. Eighteen Southeast Alaska communities draw their water from the Tongass National Forest for domestic use as do numerous logging camps, fish hatcheries, resorts, mines, and canneries.

The secondary influence area for the Tongass National Forest stretches north and west to include the entire state of Alaska; other Pacific Northwest states especially, Washington, Oregon, and California; British Columbia; and, Pacific Rim countries, especially Japan. Discussion in this document focuses on the primary area of influence and only briefly addresses the secondary area.

Historic Social Trends

Southeast Alaska's society is influenced by a variety of cultures, from its earliest peoples to its most recent inhabitants. The abundant resources of the forest and waters have provided food, shelter, and livelihood to its inhabitants for thousands of years. The first inhabitants of the area, the Tlingit and Haida, adapted well to the coastal environment, and were able to subsist on the regions natural resources and develop a rich culture. The numerous waterways allowed for mobility which aided in expanding trade and gathering food.

In the 1700's, the Russians began exploration in Alaska. The fur trade, primarily sea otter pelts, was the main force driving European colonization. When most of the sea otter populations were depleted, the fur industry declined, and Russia lost interest in her North American colony. Alaska was then sold to the U.S. in 1867.

As colonization continued with the U.S. occupation, new industries developed. In the late 1800's commercial fish canning became an important part of the economy of Southeast. During that same period, the discovery of gold brought thousands of miners to the area, many of whom were then followed by their families. The most important of the early discoveries occurred in Juneau. In the 1920's and 1930's, the Depression brought a decline in fish prices and mining employment. The impact of World War II resulted in the closures of the last remaining mines.

The timber resources were used by the earliest inhabitants for shelter, heat, utility, and cultural purposes. The Russians also harvested timber for building ships and structures, but commercial timber harvest did not develop until the 1900's. In the earlier part of the century, small timber mills were operated in a few communities, but it was not until the mid-twentieth century, that the timber industry became a major social and economic factor in Southeast Alaska, with the development of two large-scale pulp mills in Ketchikan and Sitka.

In the 1950's Alaska focused its attention on statehood. On January 3, 1959, President Eisenhower signed the proclamation establishing Alaska as our 49th state. The resultant economic shift towards more government employment and an expanding timber industry had implications beyond changes in population levels and distribution. It was a shift towards a diversified economy, with less dependence on extractive and nonrenewable resources, and away from a seasonal economy.

Today, most of the 65,000 population of Southeast Alaska is concentrated in the urban communities of Juneau (27,000) and Ketchikan (12,000), and the smaller communities of Sitka (8,000) and Petersburg (3,000). The same industries which dominated Southeast Alaska's history: fishing, mining, and timber production, are still prominent industries in most of the urban communities. In addition, tourism, which has increased in its economic importance over the past several years, provides a major source of income to the economies of all communities. Government, especially in Juneau, transportation, and education are also significant sources of income. There are numerous small, rural communities as well, which depend primarily on fishing, timber production, and subsistence for their livelihoods.

Employment and Income

Affected Environment

Southeast Alaska's economy is characterized by its dependence on four major industries, lumber and paper products, commercial fishing, tourism, and mining and mineral development.

Timber Industry

Southeast Alaska's forest product mix includes dissolving pulp, logs, cants, dimension lumber and woodchips. The industry's structure has changed significantly over the last ten years. In 1980, the industry was focused on processing timber from the Tongass National Forest into cants and dissolving pulp. The sawmills processed primarily large-diameter spruce logs. They were sawn just enough to meet the minimum federal standards for export. The smaller or defective spruce logs and most of the hemlock logs were chipped for pulping.

Today, the forest products industry in Southeast Alaska processes a wide spectrum of spruce and hemlock diameter logs into finished lumber products. The wood wastes from the sawing process are chipped for sale. In addition, a new market in Asia developed in the early 1980's for logs from lands conveyed to Alaska Native Corporations through the Alaska Native Claims Settlement Act (P.L. 92-203). Unfortunately, this structural change was painful to employees and costly to local industry. Between 1981 and 1985, total employment in the lumber and pulp mills dropped 29 percent and a number of the older and more inefficient sawmills were abandoned. However, after this structural change, the industry rebounded as market conditions improved and increased direct employment to 3,516 jobs in 1989, up 81 percent from the low in 1985 and 19 percent above the previous high in 1981 (see Table 3-257).

Because most of Alaska's forest products are exported, fluctuations in timber markets are primarily a function of the international marketplace and do not reflect activities of the region. In spite of these challenges, in 1989 the industry provided almost 16 percent more total employment than it did in 1980.

A constant supply of Tongass timber is not the only factor controlling timber employment. Other controlling factors include exchange rates, the overall Pacific Rim demand for wood fiber and competition among timber suppliers outside the Tongass National Forest. The historic timber industry employment in Southeast Alaska is shown in Table 3-257 and Figure 3-56.

Table 3-257

Timber industry employment in Southeast Alaska

Year	Direct Employment (Jobs)	Total Employment (Jobs)
1980	2,949	5,249
1981	2,733	4,858
1982	2,506	4,456
1983	2,293	4,093
1984	2,041	3,641
1985	1,947	3,447
1986	2,342	4,167
1987	2,790	4,740
1988	3,341	5,691

Source: Alaska Department of Labor, USDA Forest Service IPASS Analysis.

Figure 3-56

Source: USDA Forst Service, Alaska Region, R10-MB-55
Timber Supply and Demand Report, 1988

Commercial Fishing

Although the commercial fisheries industry in Southeast Alaska continues to fluctuate, it remains a major component of Southeast's economy. Salmon stocks recovered from their low levels in the early 1970's. Salmon continues to dominate the industry, both in the volume and value of catch, and in harvest-related employment. The labor force and employment associated with fishing is highly seasonal.

Table 3-258 shows that fish harvest employment remained relatively stable between 1979 and 1984, largely because Alaska's commercial fisheries have become increasingly regulated. In the case of salmon, a permit system regulates the number of harvesters with access to the fishery, or, in the case of halibut, harvest is regulated through limited openings or seasons.

Seafood processing, also a vital component of Southeast Alaska's economy, has undergone some changes since 1980. Of major significance were an increased use of floating fish processing facilities, and a trend toward frozen rather than canned salmon.

Table 3-258

Fish harvesting and employment in Southeast Alaska

Year	Salmon Harvest (1000 pounds)	Direct Employment (Jobs)	Total Employment (Jobs)
1980	93,027	3,475	4,700
1981	110,718	3,142	4,267
1982	122,991	3,332	4,507
1983	155,676	3,078	4,178
1984	154,846	3,277	4,452
1985	231,024	3,450	4,675
1986	214,997	3,500	4,750
1987	73,532	3,600	4,875
1988	90,696	3,500	4,725

Source: Alaska Commercial Fisheries Entry Commission, Alaska Department of Labor, Research and Analysis Section, USDA Forest Service IPASS analysis March 1990.

Recreation And Tourism Industry

During the 1980's, tourism became a major industry in Southeast Alaska (Table 3-259). Cruiseships traveled the Inside Passage making regular stops at Southeast ports in record numbers. Between 1980 and 1986, cruiseship passenger numbers increased by nearly 90 percent. Total visitors to Southeast Alaska grew from 205,000 in 1983 to 350,000 in 1986. The tourist season also expanded to include much of May and September. Its economic significance is likely to increase.

Table 3-259

Recreation and tourism for Southeast Alaska

Year	Southeast Cruiseship Passenger Numbers[1]	Southeast Ferry System Use[2]	Airline Departure Juneau[3]	Scenic Flight Passengers Misty Fiord[4]
1975	46,279	230,000	110,660	NA
1980	86,815	276,000	155,699	3,000
1981	83,566	282,000	156,257	6,300
1982	87,358	300,000	150,871	5,200
1983	99,706	308,000	167,302	5,300
1984	118,781	311,000	168,685	7,000
1985	137,005	313,000	163,837	12,000
1986	164,400	296,070	156,667	11,900
1987	202,000	326,644	157,952	12,200
1988	198,870	344,209	167,314	8,500
1989	193,983	343,100	176,429	8,100

[1] From U.S. Customs Data as collected by McDowell Group, Juneau, Alaska.

[2] From Doug Burton, Alaska Marine Highway Program - Traffic Division (465-3946), Annual Traffic Reports - "Traffic Volumes by Port" Represents Boarding Passenger numbers.

[3] From Juneau Airport Manager's Office (789-7821). Represents departing passenger numbers. Only a fraction are tourists. Included as an indication of visitation - business or pleasure - to Southeast Alaska.

[4] From Misty Fiords National Monument (225-2148).

Marketing studies by the Alaska Division of Tourism indicate that "scenery, forest, mountains, out-of-doors" and "wilderness, unspoiled, rugged" were the top interests appealing to potential visitors (Bright, 1985). Resident recreation also increased during the 1980's as indicated by fishing and hunting license sales.

Unlike other industries, the tourism and recreation "industry" is not a single industry, but a composite of many that serve more than tourists. For example, retail trade, service, and transportation serve tourists as well as local industries and residents. The labor force and employment associated with tourism and recreation are different than manufacturing. The jobs tend to be highly seasonal and low paying. Recreation and tourism employment is shown in Table 3-260.

Table 3-260

Recreation and tourism employment in Southeast Alaska

Year	Direct Employment (Jobs)	Total Employment (Jobs)
1980	2,100	3,000
1981	2,200	3,125
1982	2,300	3,250
1983	2,400	3,400
1984	2,500	3,550
1985	2,600	3,675
1986	2,700	3,825
1987	2,800	3,925
1988	2,750	3,900

Source: USDA Forest Service IPASS Analysis, March 1990.

Mining And Mineral Development

Mineral exploration and mining have been a part of life in Southeast Alaska for over 120 years. Today, the mining industry is exploring new areas for potential mineral deposits and is revisiting historic mining areas using modern exploration techniques. There are 13 identified mineral deposits on the Tongass National Forest that appear economically viable for development under today's market conditions. The present net value of these 13 deposits is estimated at 25.6 billion dollars. Today, mining development activities are centered primarily on the Quartz Hill molybdenum site in Misty Fiords and the Greens Creek silver and gold mine on Admiralty Island. Reopening of the A-J and Kensington mines in the Juneau area is currently under consideration.

Prospects for Southeast Alaska's mining industry appear to be positive for precious metals, however, much will depend on whether the strength of world prices can support Alaska's high exploration, development and production costs.

The Greens Creek project is a major metals mine containing silver, gold, zinc and lead on the northwest end of Admiralty Island, approximately 18 miles from Juneau. Exploration of the site began in 1973 and the mine has been fully operational since 1989. Greens Creek is the largest silver mine in North America, producing up to 1,000 tons of ore per day. The mine has an estimated life in excess of 10 years and employs about 225 people who commute from Juneau daily via a work boat to Young Bay on Admiralty Island.

The Quartz Hill molybdenum deposit in Misty Fiords National Monument was discovered in 1974 and is considered to be one of the largest such deposits in the world, containing as much as 10 percent of the free world's know reserves. Molybdenum is used as a hardening agent in the production of steel. If the tailings disposal issue can be resolved, and molybdenum values increase, development of the mine is likely. The mine could produce 80,000 tons of ore per day through an open pit mine operation, and employ 850 to 900 people, most of whom could commute from Ketchikan. Expected life of the mine is predicted to be a minimum of 70 years.

Employment and wages of the four largest industries in Southeast Alaska affected by the Tongass are summarized for the years 1980 through 1988 in Table 3-261. Overall employment increased between 1980 and 1988 by nearly 14 percent, after falling slightly during the mid eighties due primarily to a depression in the timber market.

Table 3-261

Total employment generated by major industries in Southeast Alaska

Year	Timber	Commercial Fishing	Recreation and Tourism	Mining and Development	Total
1980	5,249	4,700	3,000	170	13,119
1981	4,858	4,267	3,125	80	12,330
1982	4,456	4,507	3,250	80	12,293
1983	4,093	4,178	3,400	150	11,821
1984	3,641	4,452	3,550	160	11,803
1985	3,447	4,675	3,675	180	11,977
1986	4,167	4,750	3,825	160	12,902
1987	4,740	4,875	3,925	280	13,820
1988	5,691	4,725	3,900	600	14,916

Source: Alaska Commercial Fisheries Entry Commission; Alaska Department of Labor, Research and Analysis Section; USDA Forest Service IPASS Analysis, March 1990.

Employment and Income

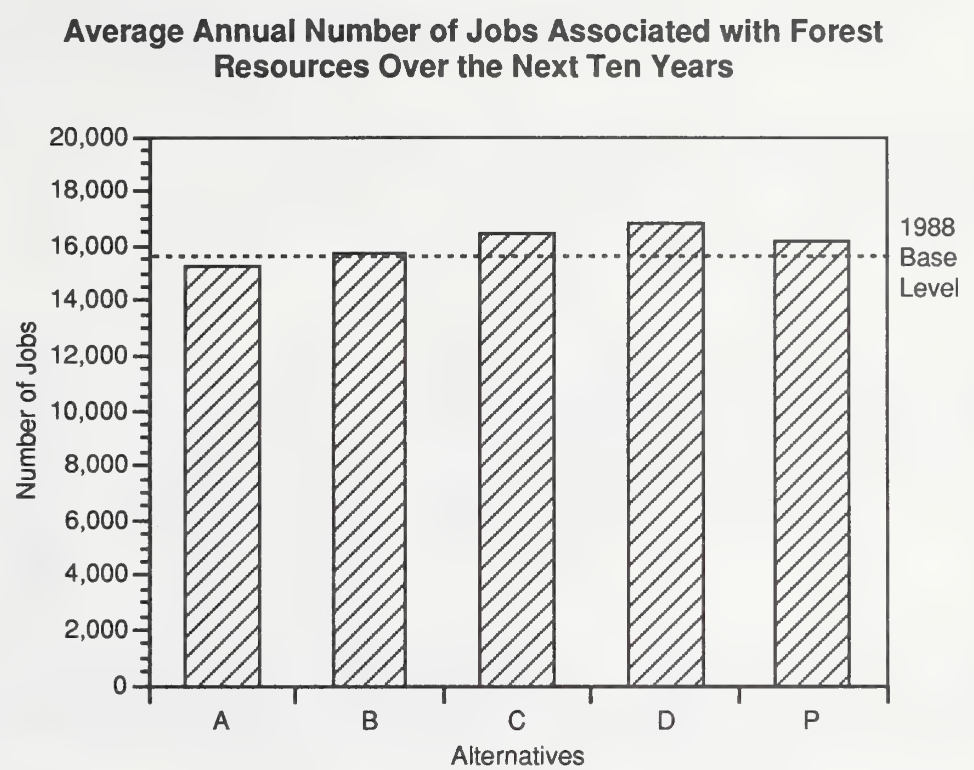
Environmental Consequences

The mix and level of goods and services provided in each alternative has the potential to affect the number of jobs throughout Southeast Alaska. In estimating job impacts it is assumed that other supply and demand factors affecting "markets" for Forest products and uses remain constant. This assumption becomes more tenuous the further out in time projections of effects are made. For example, the amount of timber offered for sale by the Tongass is not, and will never be, the only factor that affects the number of timber industry jobs. Worker productivity, interest rates, import and export levels, production and shipping costs, regional competition, private and public land harvest levels and policies, and other factors all affect the supply of and demand for timber and the subsequent number of jobs. Therefore, the focus of this analysis is on the comparison of potential first decade changes in the number of jobs for each alternative relative to a base historical level.

The number of jobs associated with each alternative was estimated using an input-output model called Interactive Policy Analysis Simulation System, or IPASS for short. In this model, estimates are a function of changes in final demand resulting from changes in output levels. Changes in output or activity levels initiate expenditures in various sectors of the local economy which trigger the change in jobs (and income). On the Tongass, job and income effects are based on changes in the amount of timber volume harvested, recreation use, hunting and fishing use, commercial fishing, and areas open to mineral entry.

To estimate the potential changes in jobs and income associated with each alternative, a base level was established for each output. The base level year is 1988 and the number of total jobs provided that year was 15,544. Figure 3-57 displays the total number of jobs for each of the five proposed alternatives. Alternative D would provide the greatest number of job opportunities estimated at 16,800 while Alternative A would provide the fewest job opportunities with 15,250. All alternatives except A provide total jobs opportunities in excess of the 1988 base year level. However, this is not the case when individual resource sector jobs are compared to base year levels.

Figure 3-57

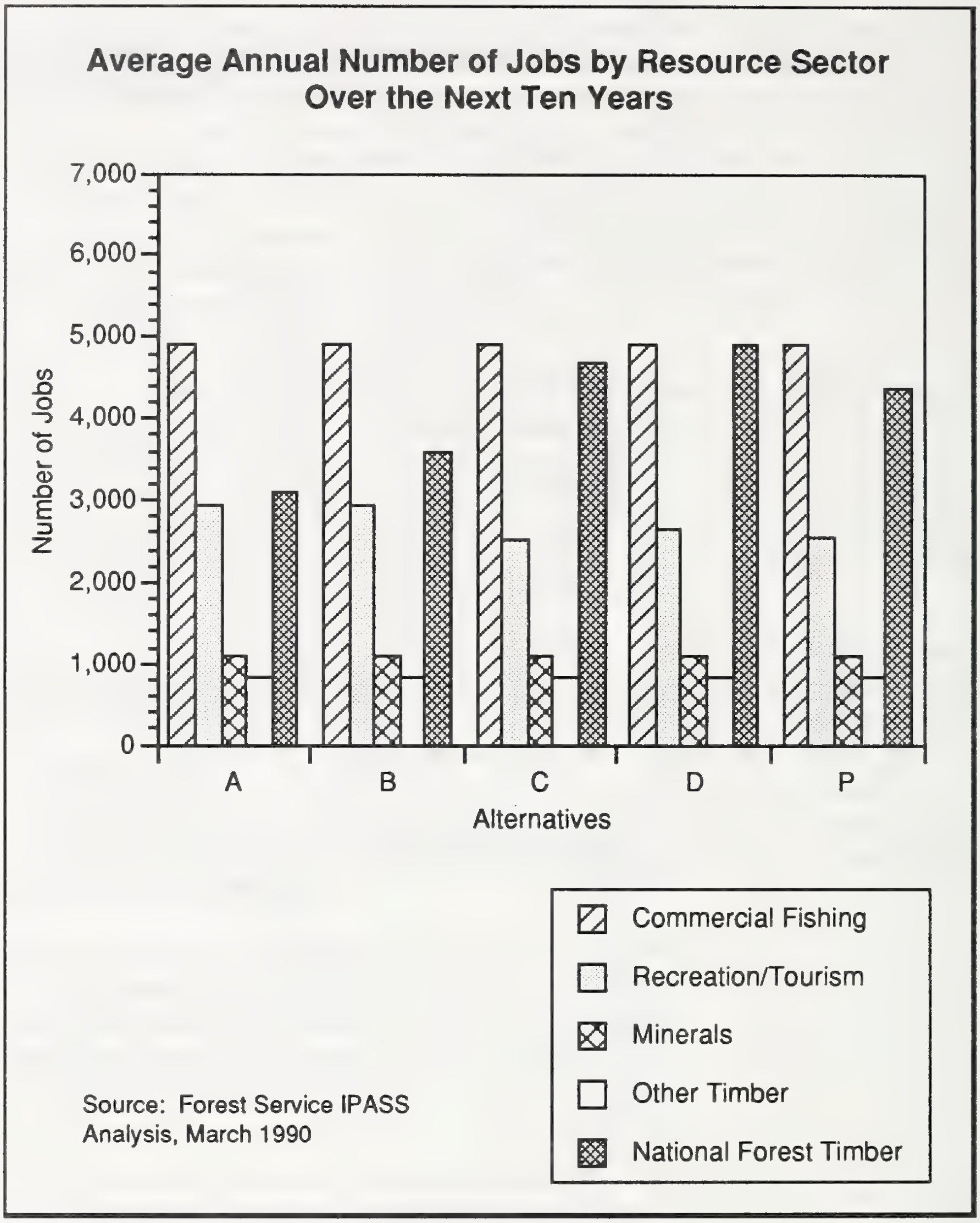


Source: Forest Service IPASS Analysis, March 1990

While the total number of job opportunities changes for each alternative, the number of jobs related to some resource sectors do not vary between alternatives. More specifically, the number of jobs related to commercial fishing, mining and mineral development, and non-Federal timber shown are constant in each alternative (Figure 3-58). Unlike these resource sectors, jobs related to timber harvesting on the National Forest and recreation/tourism vary by alternative.

Across all alternatives, commercial fishing and mining/mineral development jobs are estimated to exceed base year levels by 200 and 500 jobs, respectively. Because of the predicted decline in timber harvest on State and private land, timber-related jobs associated with non-Federal lands are estimated to fall beneath base year levels by 1,474 jobs in all alternatives. National Forest related timber job opportunities fluctuate above and beneath base year levels depending on the alternative. Similarly, recreation/tourism job opportunities fluctuate in the future depending on the level of increase in recreation use in each alternative.

Figure 3-58



Commercial Fishing

In estimating jobs associated with commercial fishing, the assumption is that two-thirds of the total fish production in Southeast Alaska is salmon and that 80 percent of the salmon originate from National Forest lands. The result is that 2,505 of the 4,727 current jobs related to commercial fishing are assumed attributable to the Tongass. It is also assumed that these 2,505 jobs change at the same rate as the commercial fish habitat capability on the Forest. Timber harvest and related activities have no measurable effect on fish under the current standards and guidelines and management area prescriptions (Chapter 3, Fish). Commercial fish habitat capability increases from 110.6 million pounds to 118.8 million pounds (7 percent) in the mid-1990's in all alternatives due to assumed construction of scheduled fish improvement projects during the 1990's. Consequently, commercial fish related jobs attributable to the Tongass are

estimated to increase from 2,505 to 2,691 jobs in all alternatives. Commercial fish job opportunities not attributable to the Tongass are assumed to remain constant. Total job opportunities related to commercial fishing are estimated at 4,925 (rounded to the nearest 25 jobs) in all alternatives.

Mining And Mineral Development

Mining employment for the base year (600 jobs) were derived from the 1988 base year IPASS model by the Pacific Northwest Experiment Station. The U.S. Bureau of Mines projects that mining jobs will likely increase to 1,100 in the 1990's. This total is reflected in all alternatives since the identified economically viable mineral deposits are either open to mineral entry in all alternatives or have valid existing rights.

Non-Federal Timber

Timber harvesting from State and private land was 421.3 million board board feet in 1988 (1988 Timber Supply and Demand Report). The Alaska Timber Markets Study indicates that harvest from these sources will decline about 64 percent during the 1990's. It is assumed that jobs generated from this harvest will decline by the same percentage leading to a fall in non-Federal timber-related jobs to about 825 (rounded to the nearest 25 jobs) in all alternatives (Figure 3-59).

National Forest Timber

National Forest timber-related jobs for the base year were taken from the 1988 Timber Supply and Demand Report. Future timber employment is based on 8.67 total jobs per million board feet (8.67 jobs/MMBF) used in the most recent Timber Supply Program Information Reporting System. Timber employment is derived by multiplying 8.67 by the total timber sale program (allowable sale quantity and utility volume) which is different for each alternative. This explains why National Forest timber-related jobs vary by alternative while several other resource sector jobs remain constant. National Forest timber-related job opportunities would likely meet or exceed the 1988 base level in Alternatives B, C, D, and P. Alternative A falls below the 1988 base level (Figure 3-59).

Long-Term Sales. Long-term timber sale contracts were established in the 1950's to attract the timber industry and stable jobs to Alaska. Two of the original four long-term contracts still operate on the Tongass and are held by Ketchikan Pulp Company (KPC) and Alaska Pulp Corporation (APC) (Chapter 3, Timber). Maintenance of existing contracts depends on the amount of timber volume scheduled within existing contract area boundaries. The KPC contract is currently scheduled to harvest an annual combined net sawlog and utility log volume of 214 million board feet during the next ten years. The APC contract is currently scheduled to harvest an annual combined net sawlog and utility log volume of 157 million board feet during that same time period. More than 3,200 timber-related jobs are associated with the two long-term contracts.

Alternative C reflects the approximate Current Plan allowable sale quantity while Alternative D would increase the available timber supply about 5 percent. Figures 3-59 and 3-60 display the range of job opportunities in the alternatives related to the timber industry.

Although there is some reduction in the available timber supply in Alternatives A, B, and P, long-term contract requirements could be met in these alternatives with some adjustments to sale area boundaries, but would likely affect jobs associated with the independent and small business set aside program and could lead to a change in current mill capacity infrastructure (Figure 3-60).

Short-Term Sales. Between 1980 and 1989, annual average harvest for short-term sales was about 82 million board feet of sawlogs and an additional 12 million board feet of utility volume (Revision DEIS, Chapter 3, Timber). About 50 percent of the sold short-term volume has been purchased through the Small Business Association (SBA) set aside program (Chapter 3, Timber). This translates into about 815 timber-related jobs.

For the independent and set-aside timber sale programs, the alternatives would provide a range in timber supply from 0 sawlog plus utility volume in Alternative A to 132 million board feet in Alternative D. This would, in turn, provide a range from 0 to 1,144 timber-related job opportunities. Alternatives C, D, and P could maintain or increase job opportunities related to short-term timber sales. Alternative B would reduce short-term sale volume below historic levels, and Alternative A would eliminate the short-term sale program.

Figure 3-59

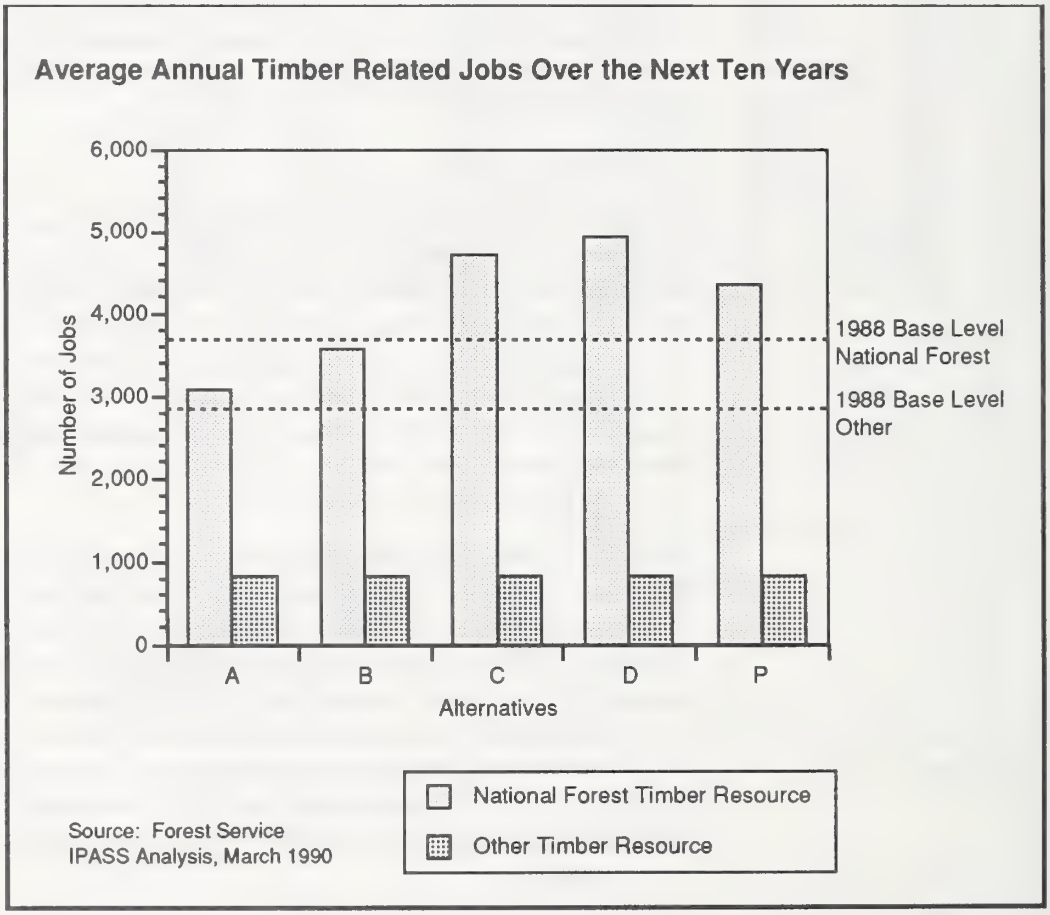
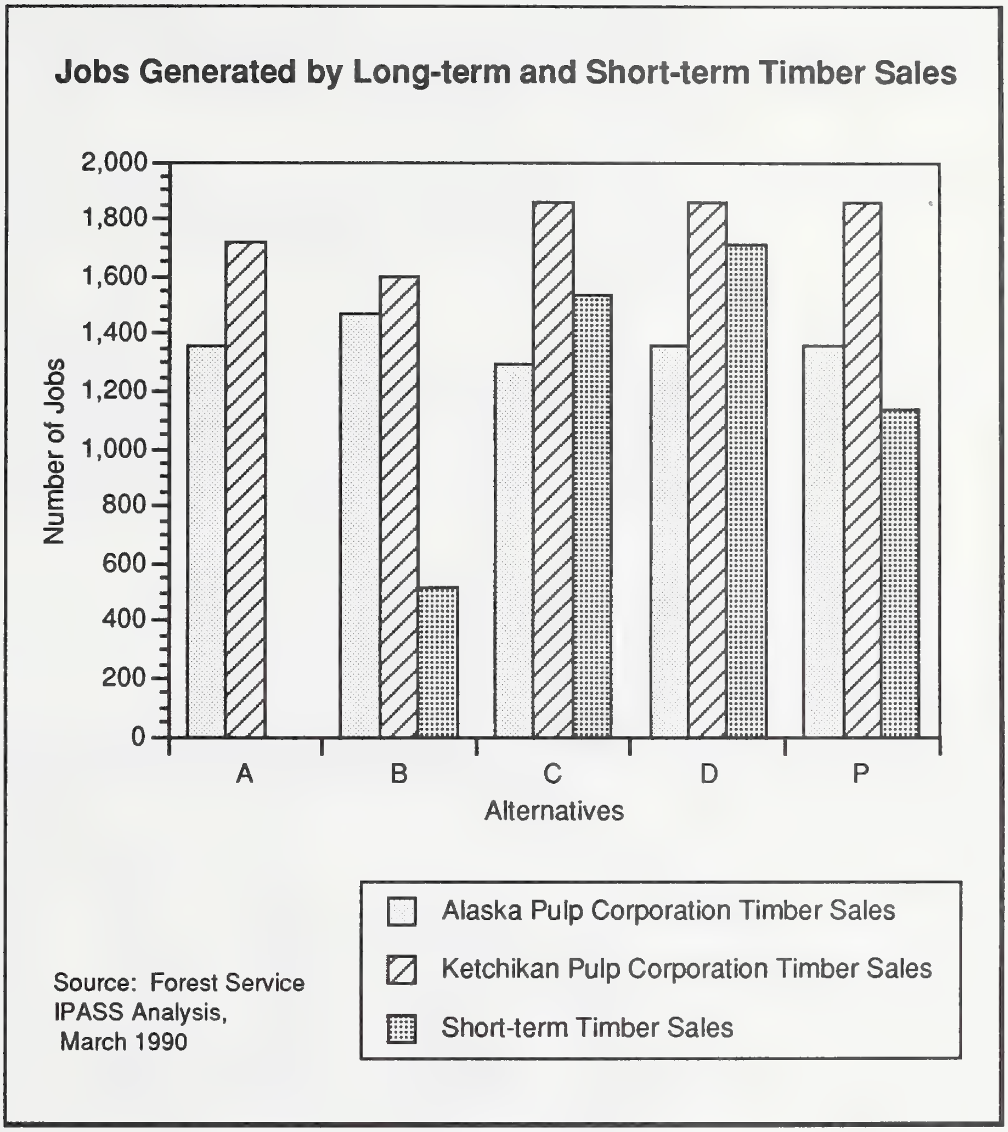


Figure 3-60



Recreation And Tourism

Recreation and tourism jobs were derived from the 1988 base year IPASS model by the Pacific Northwest Experiment Station (PNW) and include sport hunting and fishing jobs. The Station used results from a 1988 visitor survey conducted in Southeast Alaska by Data Decision Group, Inc. for recreation and tourism jobs. Results from the Juneau Sport Fish Study conducted by Jones and Stokes Associates were used for sport fishing jobs. PNW used results from a 1988 hunter survey conducted by Alaska Department of Fish and Game for hunting related jobs.

Future recreation and tourism, sport hunting and fishing jobs are projected to change at the same rate as future use. The increase in projected use is 36 percent for sport fishing, and 53 for hunting-related jobs during the 1990's for all alternatives. However, due to timber harvesting in recreation places the amount of increase in recreation use varies between the alternatives. The largest amount of recreation use increase occurs in Alternatives A and B, the smallest increase is in Alternative C, while Alternatives D and P show moderate increases.

Consequently, total recreation and tourism related jobs are estimated to increase according to the same pattern. Alternatives A and B have the largest increase in recreation and tourism-related jobs with a 36 percent increase. Alternative C shows the smallest increase in jobs with an increase of 26 percent. Alternatives D and P will show increases in recreation and tourism employment of 29 and 26 percent respectively.

Income

Average annual income (1990 dollars) was estimated for the first decade using the IPASS model. Figure 3-61 shows that Alternatives C, and D have the highest income level potential with $567.7 million and 579.9 million respectively. Alternative A displays the lowest income with $516.6 million.

As with total jobs, only total income associated with different levels of timber harvest and recreation/tourism change across all alternatives (Figure 3-62). Alternative D provides the greatest opportunity for timber-related income with $222.5 million and Alternative A the least with $151.8 million. Alternatives A and B provide the greatest opportunity for recreation and tourism-related income with $78.9 million and Alternative C the least with 68.1 million.

Figure 3-61

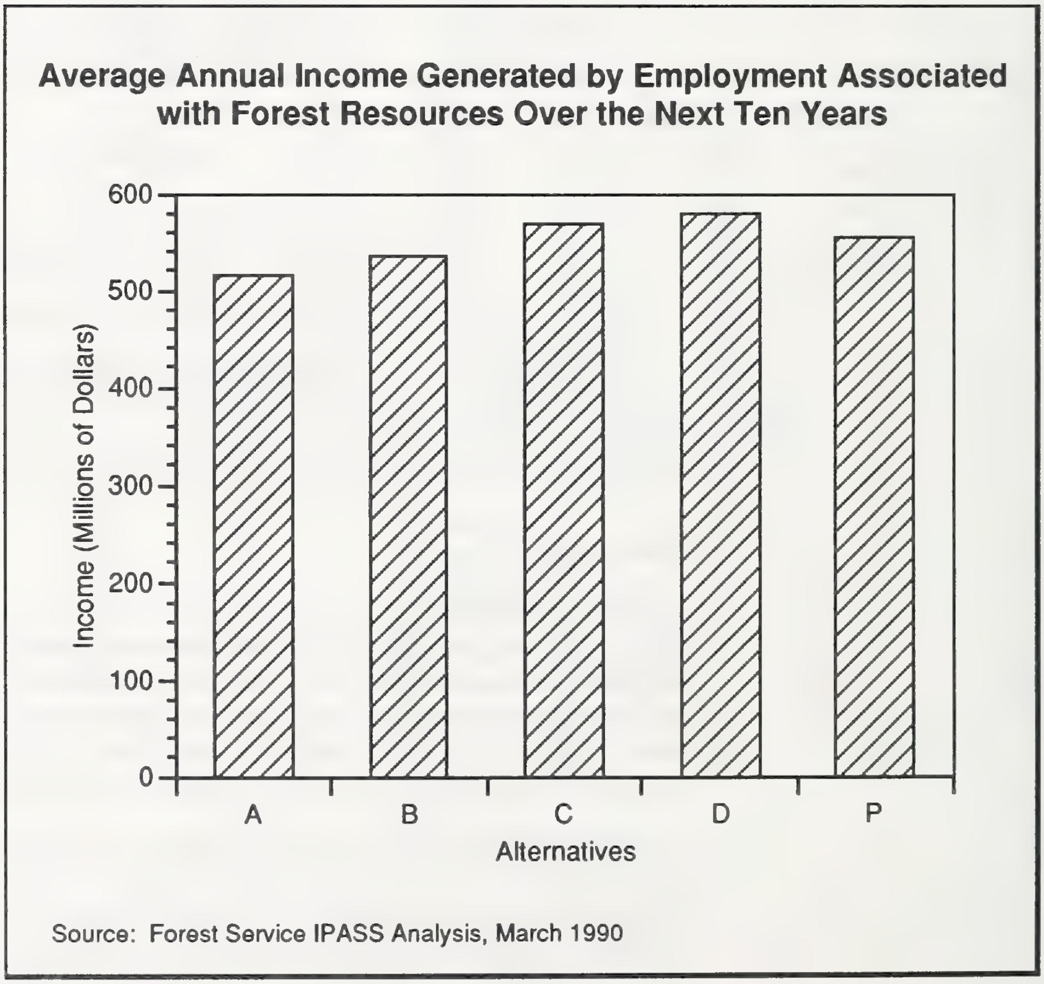
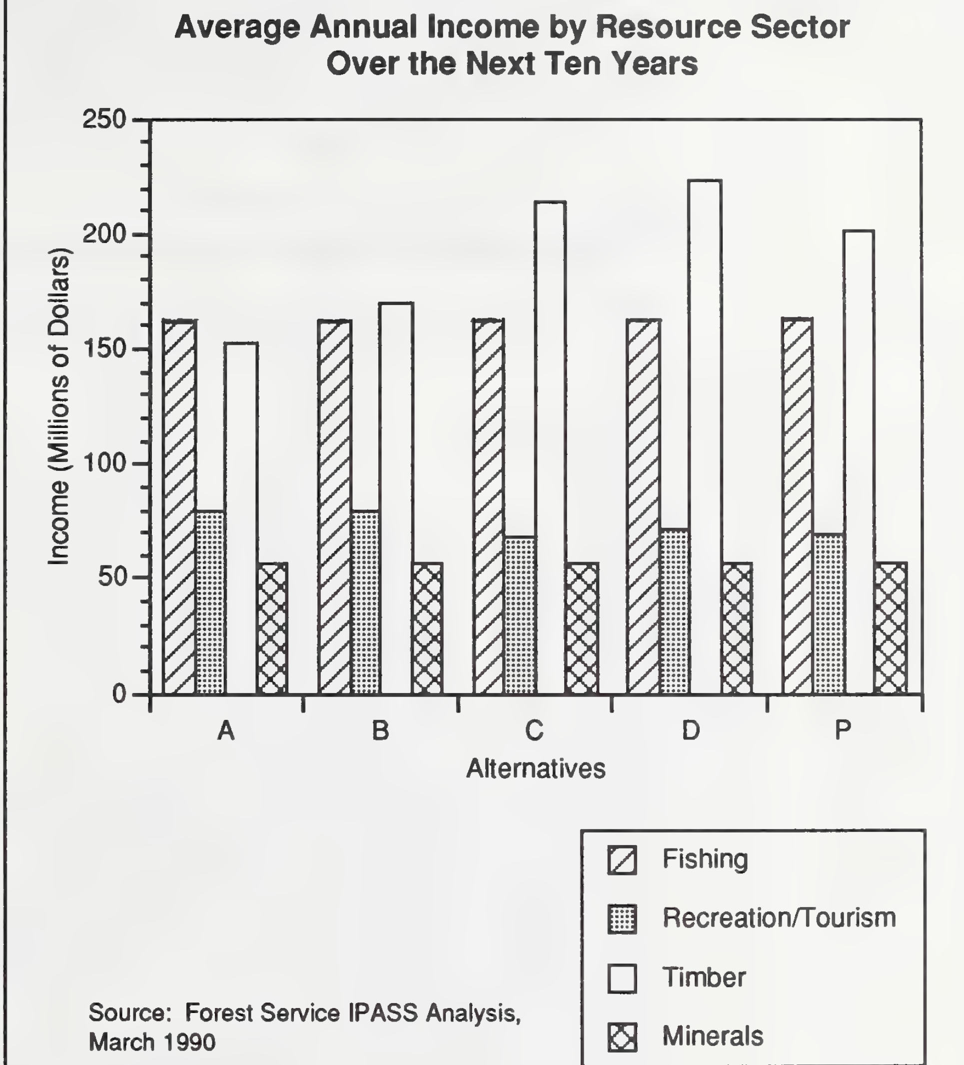


Figure 3-62



Source: Forest Service IPASS Analysis, March 1990

Net Cash Flow and Payments to State

Affected Environment

Table 3-262 shows the total receipts from the Tongass timber program and payments to the State of Alaska. With few exceptions, 25 percent of all monies received (including purchaser road credits) from the Tongass is paid to the State of Alaska. The funds are used to benefit public schools and public roads. The amount of funds contributed in the past has not comprised a significant portion of the total public school and public road budgets for the City and Boroughs of Southeast Alaska.

Table 3-262

Forest receipts and payments to the state of Alaska, FY 1980-1990

Fiscal Year	Tongass Receipts[1]	Payments to Alaska
1980	26,024,494	6,506,124
1981	15,007,944	3,751,986
1982	21,622,764	5,405,691
1983	5,365,915	1,341,479
1984	4,063,189	1,015,797
1985	209,231	52,308
1986	1,967,240	491,810
1987 [2]	-2,033,575	—
1988	1,232,672	308,168
1989	20,183,133	5,045,783
1990	35,544,272	8,886,068
Total	**129,187,278** [3]	**32,805,213**

Source: ANILCA 706(a) Draft 1988 Supply and Demand Report Number 8, and 1990 Timber Sale Program Information Reporting System (TSPIRS).

[1] Capital investments such as permanent roads, bridges, log transfer facilities, and timber stand improvements also contribute to the total assets of the Tongass National Forest, reduce future management costs, and are scheduled to achieve management objectives described in the Tongass Land Management Plan.

[2] Tongass receipts for fiscal year 1987 were negative as a result to Comptroller General Decision B-224730 of March 31, 1987 to retroactively implement the emergency rate redeterminations for short-term sales. Without the reduction, Tongass receipts would have been positive by $2,139,943. As a result of the negative receipt, no payments to the State were made in 1987.

[3] Does not include receipts foregone as a result of the Federal Timber Contract Payment Modification Act. Estimated total value of affected contracts was approximately $54.5 million prior to the Act if all volume were harvested. Total value of the affected contracts as a result of the Act was approximately $1.2 million. The difference of $53.3 million represents receipts foregone, thus, the total Tongass receipts for the period fiscal years 1980-88 would have been $126.8 million.

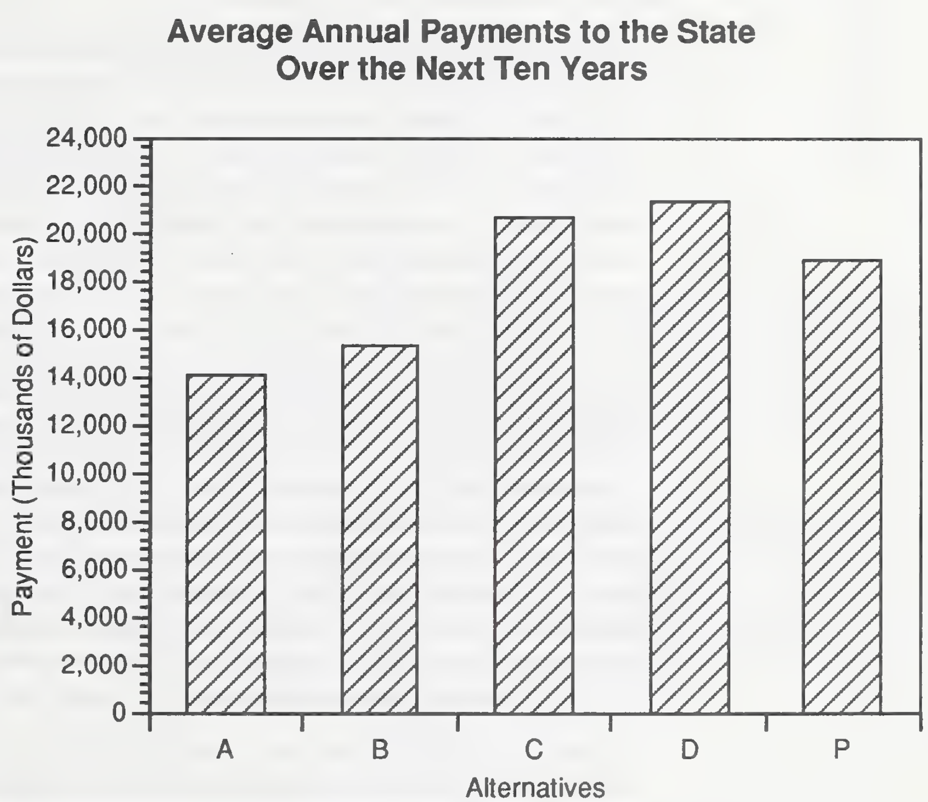
Net Cash Flow and Payments to State

Environmental Consequences

Dollar payments to the State of Alaska are based on the 25 percent formula for uses of the Tongass land and resources that generate income for the Federal government. Ninety-nine percent of the payments to the State from Federal receipts are generated from timber sales. Money returned to the State is earmarked for use on public schools and roads. When money returns drop, the state must come up with other sources of revenues to maintain the same quality and quantity of school and road programs. This, in turn, may decrease the money available for other programs.

Figure 3-63 displays payments to the State of Alaska by alternative. Under anticipated mid-market conditions, Alternative A could generate up to $14.1 million in payments to the state annually, while Alternative D would generate up to $21.2 million. These two alternatives represent the range within which the other alternatives fall. The average payment to the State between 1980 and 1990 was $3.0 million.

Figure 3-63



Source: Forest Service FORPLAN Anaylsis, March 1990

Table 3-263 displays cash flows to and from the U.S. Treasury for each alternative in 1990 dollars. The table also displays the non-cash benefits for each alternative.

The total cost column in the table represents the total cost of managing the National Forest under each alternative. The total cost amount includes the cost of the recreation, wildlife, fisheries, transportation, and timber programs as well as the stewardship and protection costs of the Tongass.

Total revenue as shown in the table displays the gross cash revenues the Federal Government will receive in each alternative. This includes revenues from timber sales, user fees, special use authorizations, land uses, power permits, and mineral leasing.

The largest contributor to the total amount is the timber sale revenues. Revenues other than timber only account for approximately $175,000 per year in each alternative. The amount of variation in the total revenue is almost directly related to the amount of timber harvest. Those alternatives which have the highest timber allowable sale quantity (ASQ), also have the highest potential revenues. Alternatives C and D have the largest amount of revenues due to their ASQ's of 451 MMBF and 472 MMBF respectively. Alternative C could return $83.3 million per year to Treasury in the first decade while Alternative D could return $86.7 million per year over the same period. Alternative A with an ASQ of 298 MMBF has the lowest potential revenues, amounting to $57.8 million per year.

Non-cash benefits are those benefits to society for which the Federal Government receives no actual financial return. Most of the goods and services produced fall into this category. Examples of this would be recreation use, sport fishing, hunting, commercial fish, and subsistence. The total benefits accrued to society in each alternative would then be the combination of total revenues and non-cash benefits. The non-cash benefits are much greater than the actual revenues received in all alternatives. This indicates most of the benefits to society are not charged for by the USDA Forest Service. The non-cash benefits do not fluctuate very much between alternatives since the amount of recreation, commercial fish, and other non-cash resources do not vary significantly between alternatives.

Net cash flow is the difference between total revenues and total cost. This amount represents the net cash flow of actual money the Federal Government could realize under each alternative. All alternatives have negative net cash flows during the next ten years. This indicates that the Government will spend more money than it will receive in revenues in all alternatives in the initial years. Most alternatives have a positive cash flow in later periods. However, a negative cash flow does not equate to a below cost timber program. The total cost used in calculating the net cash flow in Table 3-263 includes the cost of recreation, fish, wildlife and stewardship as well as the cost associated with the timber program including roads. The timber cost represents only a portion of the total cost. Conversely, more that 99 percent of the total revenue comes from the timber program. The timber revenues cover the timber costs in all alternatives.

The largest negative net cash flow occurs in Alternative A. This is due to large capital investment costs required to harvest volumes from less economically desirable stands. Since this alternative maintains the long-term sale contract harvest volume, but removes a significant amount of economically-efficient lands, it results in a large negative cash flow. Alternative P also has large negative cash flow primarily due to the large capital investments required to obtain the high harvest level of 418 MMBF per year from a reduced land base.

The lowest negative cash flow occurs in alternative C. This Alternative has the lowest negative cash flow due to the low investment levels in resources other than timber.

Table 3-263

Average annual cash flows and non-cash benefits (first decade)

(Millions Of Undiscounted 1990 Dollars Per Year)

Alternative	Net Revenue	Total Cost	Total Revenue	Non-Cash Benefits
Alternative A	-74.7	132.5	57.8	169.4
Alternative B	-71.0	133.7	62.7	1,169.3
Alternative C	-60.6	143.9	83.3	161.9
Alternative D	-73.6	1,160.4	86.7	164.1
Alternative P	-74.2	151.6	77.4	162.5

Source: Forest Service FORPLAN analysis

Table 3-264 displays the estimated fiscal impact of the Tongass timber program. The mid-market value (average pond log value of timber harvested 1980-1988) of the timber which could be offered in each alternative was compared with the estimated costs (capital investments plus operating expenses) for five decades. The table displays the anticipated average annual timber revenue, timber costs, and net timber revenue all in 1990 dollars, volume harvested, and acres harvested.

The timber sale program is anticipated to produce revenues in excess of costs cumulative over the decade for all alternatives for each Administrative Area as specified in the goal of the alternative. There is very little fluctuation in amount of net revenue from the timber program between alternatives. This lack of fluctuation is caused by specifying the maximum timber harvest possible for each alternative subject to an above cost timber program constraint. There likely will be below cost and above cost years in the coming decade.

Table 3-264

Estimated fiscal effects of the Tongass timber program by alternative (first decade average)

Item	Units	Alt. A	Alt. B	Alt. C	Alt. D	Alt. P
Costs	$1,000/Year	51,900	56,700	78,100	79,800	71,300
Revenues	$1,000 /Year	56,000	61,000	82,200	85,000	75,600
Net Revenues	$1,000/Year	4,100	4,300	4,100	5,200	4,300
Harvest	MMBF/Year	298	343	451	472	418
Harvest	MMCF/Year	72	82	108	112	100
Harvest	MAcres/Year	11.5	13.1	16.9	17.2	15.6

Source: USDA Forest Service FORPLAN Analysis.

Economic Efficiency

Affected Environment

The National Forest Management Act of 1976 (NFMA) set forth explicit requirements for economic efficiency analysis of Forest management proposals. While economic efficiency must be analyzed and considered, it is not the sole decision criterion. Although the Forest Service has generally tried to achieve cost-efficient management (lowest possible input cost per unit of output), systematic evaluation of all costs and benefits from practices and activities has been undertaken only in recent years.

The measure of economic efficiency applied in formulating and evaluating alternatives is Net Public Benefits (36 CFR 219.1(a) and 219.12(f)). Net Public Benefits (NPB) are the sum of Present Net Value (PNV) and non-priced commodity values. PNV is the difference between the discounted value of all outputs to which monetary values or established prices are assigned and the total discounted costs of managing the planning area. Examples of non-priced benefits include scenic quality, wildlife habitat, and community stability. Values of some non-priced commodities are inferred from observations of indicators such as the number of participants, tolerance of congestion, and expense of participation.

The dominant non-priced commodities for the Tongass are embodied in the planning issues. One function of the public involvement process, which produced the planning issues, was the inference of non-priced commodity values.

To account for the ultimate subjectivity of the inferred demand for non-priced commodities, a range of production of priced and non-priced commodities is provided by the alternatives considered. Within each alternative, priced and non-priced commodities are produced in the most cost-efficient method by maximizing present net value. The major components of PNV on the Tongass are timber, recreation/tourism, and commercial fish.

Economic Efficiency

Environmental Consequences

Table 3-265 is the primary display of economic efficiency by alternative. This table summarizes the changes in costs and benefits between alternatives. The alternatives are ranked in descending PNV order.

Discounted Benefits is the sum of all benefits derived from the Forest over a 160-year period. Future benefits are adjusted to reflect the loss opportunity of not having those benefits today.

The two resource categories which show changes in discounted benefits between the alternatives are recreation and tourism, and timber. These two benefit categories account for all the fluctuations in total benefits between the alternatives. Across all alternatives, commercial fish and other benefits remain constant. This is due to only very slight differences between the alternatives in terms of salmon habitat, sport hunting, sport fishing and subsistence use.

The largest amount of discounted benefits is produced by Alternative D, just over $5 billion. This alternative has the highest benefits since it generates a large amount of timber benefits while still maintaining a significant amount of recreation benefits. Despite its high level of recreation benefits, Alternative A produces the lowest amount of total benefits due to its reduction in timber benefits.

Discounted Costs are the sum of all costs incurred from the Forest over a 160-year period. Future costs are discounted to reflect the advantage of not having to incur those costs today. Among the various cost categories, only the timber item shows any substantial change between the alternatives. The higher the timber harvest level associated with each alternative, the higher its timber cost and total cost. Thus, Alternative D which has the highest timber harvest level also has the highest costs. Alternative A which has the lowest timber harvest level show the lowest total cost and timber cost.

Present Net Value is shown in the second column of the Table 3-265. This figure represents the economic efficiency of each alternative. PNV is a yardstick used to measure the economic value resulting from management of the Forest. PNV is the difference between benefits and costs associated with the alternatives. Each alternative has a specific management strategy or theme which requires certain land allocations or output levels that may not be the most economically efficient solution for the Forest.

The largest contributors to PNV are recreation and commercial fish. Of these two resources only recreation shows any changes between the alternatives, and thus effects on PNV. Although the timber resource produces a high amount of benefits, it also produces a high amount of costs and thus makes only small contributions to PNV. Alternative C produces the highest PNV due to its low total costs which is a reflection of not having a fully funded budget for some resources, and a relatively high revenue from timber harvest. Alternative P produces the lowest PNV due to a lower contribution from recreation and high total costs.

Historically the timber market has been cyclic with sharp peaks and valleys in pond log value. A $20/MBF (thousand board feet) change in market price can mean as much as a 100 MMBF (million board feet) swing in the ability of the Forest to provide an economic supply. Therefore, the PNV yardstick as it relates to the timber revenue component is subject to large fluctuation from year to year.

Table 3-265

Present Net Value comparison of alternatives (millions of 1990 dollars)

				Discounted Benefits by Resource				Discounted Costs By Category				
Alt.	Present Net Value	Total Discounted Cost	Total Discounted Benefits	Comm. Fish	Recreation	Timber	Other[1]	Wildlife	Timber	Recreation	Protection	Other[2]
C	2,441	3,329	5,770	2,042	1,189	1,676	863	293	1,665	353	124	894
A	2,291	3,083	5,374	2,042	1,379	1,090	863	444	1,049	421	132	1,037
B	2,280	3,251	5,531	2,042	1,375	1,251	863	444	1,217	421	132	1,037
D	2,153	3,735	5,888	2,042	1,245	1,738	863	444	1,701	421	132	1,037
P	2,100	3,557	5,657	2,042	1,204	1,548	863	444	1,523	421	132	1,037

Source: USDA Forest Service FORPLAN Analysis.

[1] Other discounted benefits include (hunting, sport fishing, and subsistence)

[2] Other discounted costs include stewardship costs, minerals, soils, water, and air management projects.

Resource Demand Analysis

Environment and Effects

Introduction

This section will describe the anticipated demand for the various goods and services produced by the Tongass and how each alternative responds to meeting those demands. Demand will be discussed for the following resources, recreation/tourism, hunting, fishing, timber, and commercial fish.

Timber

Tongass National Forest Timber is traded in the Pacific Rim Market. Over 90 percent of the wood pulp produced in Alaska is exported. The solid wood products (logs, cants and lumber) are shipped to Japan, Korea, the Peoples Republic of China, Taiwan and Canada. The dissolving pulp produced from the hemlock and lower-grade spruce logs is shipped to a wider array of countries. For example, in 1988, pulp products were shipped from Alaska to Argentina, Austria, Bangladesh, Belgium, Bulgaria, China, Egypt, France, West Germany, India, Indonesia, Iraq, Japan and six other foreign countries. Approximately 15 percent of the dissolving pulp produced in Alaska is shipped to destinations in the continental United States. The Pacific Rim demand for wood products far exceeds the productive capability of the Tongass National Forest. The Tongass is a very small player in a very large market. It is anticipated that the Pacific Rim market will be able to purchase all the wood products which can be supplied at a cost lower than export value.

Hunting

The historic demand for hunting on the Tongass is displayed in Table 3-266. Hunting for most animals has been increasing on the Tongass during the 1980's. Deer hunting has increased 57 percent from 31,400 hunter days in 1980 to 49,400 hunter days in 1988. The peak demand was in 1986 when the Tongass experienced 67,200 deer hunter days. Black bear hunting has increased from 800 hunter days in 1980 to 1,700 hunter days in 1987. This represents an increase of more than 112 percent in seven years. Brown bear hunting has also increased but not at the same rate as black bear hunting. The number of brown bear hunter days rose from 500 in 1980 to 700 in 1987 (40 percent).

Due to the limited population of moose and mountain goats, the amount of hunting has been limited by the State Game Board. Therefore the number of hunter days shown in Table 3-266 may not be reflective of the total demand for hunting these animals.

Table 3-266
Historic hunting use (hunter-days per year)

Year	Deer Hunting	Black Bear Hunting	Brown Bear Hunting	Moose Hunting	Mtn. Goat Hunting	Water Fowl Hunting
1980	31,400	800	500	NA	1,400	NA
1981	NA	800	400	NA	1,800	NA
1982	45,700	1,000	400	NA	1,800	NA
1983	52,600	900	600	NA	1,700	14,400
1984	54,500	1,100	600	5,800	1,500	13,500
1985	50,300	1,400	500	4,400	1,500	10,100
1986	67,200	1,600	600	4,000	1,400	10,100
1987	67,000	1,700	700	4,200	1,300	NA
1988	49,400	NA	NA	4,200	NA	NA

Source: Alaska Department of Fish and Game records.

Future predicted hunting use was estimated for deer, black bear, and brown bear hunting only. Since the hunting of moose, mountain goats, and waterfowl hunting has been limited by the State Game Board due to small populations, and/or limited habitat and is not expected to change significantly in the future, no projections were made for these types of hunting. In addition, it is not anticipated that any management activities considered in any of the alternatives is expected to significantly alter the amount of habitat or populations of these species.

The use projections are shown in Table 3-267. Use was considered to be a function of population in the market area for these projections. A demand model was developed which related past bear hunting use to past human population. Population projections for the market area were obtained from the Bureau of Economic Analysis 1985 and were used in the model to make a prediction about future use. The results are displayed with a 95 percent confidence interval.

Deer hunting and number of hunters has declined over 30 percent since 1986. There were steady increases from 1980 to 1986. Therefore, there is no clear trend for deer. The 1989 use is used with no projected increase.

Table 3-267
Projected hunting use (hunter-days per year)

Type of Hunting	Projected Use	Likely Range of Projected Use (with a 95% Confidence Interval)
Deer Hunting	45,300	
Black Bear Hunting	2,600	2,000 to 3,200
Brown Bear Hunting	900	500 to 1,200

Source: USDA Forest Service Demand Projections, 1990.

Table 3-268 displays how each alternative meets the anticipated use for hunting. The table displays the projected use, capacity and what percent of that capacity is needed for each species hunted by alternative.

Projected deer hunting use is met in every alternative for the next decade. The expected demand for deer hunting will range between 89 and 92 percent of the potential deer harvest capacity (10 percent of winter range habitat capability). Reductions in deer harvest capacity are almost directly related to the timber harvest levels in the alternatives. The greater the level of timber harvest, the sharper the drop in hunting capacity.

Projected black bear hunting is met in every alternative for the next decade. The expected demand for black bear hunting will be 89 and 91 percent of the potential black bear harvest capacity (10 percen of habitat capability) in all alternatives. Reductions in black bear harvest capacity are almost directly related to the timber harvest levels in the alternatives. The greater the level of timber harvest, the sharper the drop in hunting capacity.

Projected brown bear hunting is met in every alternative for the next decade. The expected demand for brown bear hunting will average about 90 percent of the potential brown bear harvest capacity (10 percen of habitat capability). Reductions in brown bear harvest capacity are almost directly related to the timber harvest levels in the alternatives. The greater the level of timber harvest, the sharper the drop in hunting capacity.

If capacity proves to be insufficient to meet anticipated harvest, a reduction in the success rate of hunters, imposition of reduced bag limits, or shorter harvest seasons are likely.

Table 3-268
Relationship of anticipated use to future capacity for hunting by alternative

	Alternative				
	A	B	C	D	P
Deer					
Projected Hunting	45.3	45.3	45.3	45.3	45.3
Hunting Capacity	93.3	93.0	90.6	90.1	91.5
Percent of Capacity Used	89%	90%	92%	92%	91%
Black Bear					
Projected Hunting	2.6	2.6	2.6	2.6	2.6
Hunting Capacity	3.2	3.2	3.2	3.2	3.2
Percent of Capacity Used	81%	81%	81%	81%	81%
Brown Bear					
Projected Hunting	.9	.9	.9	.9	.9
Hunting Capacity	1.0	1.0	1.0	1.0	1.0
Percent of Capacity Used	90%	90%	90%	90%	90%

Sport Fishing

Sport fishing has increased more than 41 percent from 1977 to 1987 on the Tongass. The largest component of sport fishing demand has been for the five species of salmon. Future projections for total sport fishing on the Tongass is displayed with the historic use levels in Table 3-269. The projections were considered to be a function of human population in the

market area. A model was developed which related past sport fishing use to past population. Population projections for the market area from the Bureau of Economic Analysis 1985 were input into the demand model to predict future demand. The results are displayed showing the range of likely future use within a 95 percent confidence interval.

Table 3-269

Historic and projected sport fishing use (fish user days per year)

Year	Sport Fish Use	Range of Likely Use With 95 Percent Confidence Interval
1977	115.5	
1978	103.3	
1979	106.7	
1980	117.8	
1981	115.7	
1982	135.2	
1983	143.4	
1984	145.0	
1985	152.7	
1986	155.1	
1987	163.2	
1995	(Predicted) 202.1	178.5 to 225.7

Source: Alaska Department of Fish Game, Michael J. Mills, November 1987; USDA Forest Service Demand Analysis, 1990.

Table 3-270 displays how each alternative meets the projected use for sport fishing, displays the projected capacity and displays what percent of the capacity is used in each alternative. Every alternative produces significantly more sport fishing capacity than projected use. In the next decade projected use is only 22 percent of the potential capacity.

Table 3-270

Relationship of anticipated use to future capacity for sport fishing by alternative

	Alternative				
	A	B	C	D	P
Projected Sport fishing	202.1	202.1	202.1	202.1	202.1
Sport Fishing Capacity	905.6	905.6	905.6	905.6	905.6
Percent of Capacity Used	22%	22%	22%	22%	22%

Source: USDA Forest Service FORPLAN Analysis.

Commercial Fishing

Alaskan commercial fish are traded in the Pacific Rim Market. Most of the commercial fish harvested in Alaska is exported. The fish are shipped to Japan, Korea,the Peoples Republic of China, Taiwan, Canada, other foreign countries and the continental United States. The Pacific Rim demand for fish far exceeds the productive capability of the Tongass National Forest.

The Tongass is a very small player in a very large market. It is anticipated that the Pacific Rim market will be able to purchase all the commercial fish harvested from Southeast Alaska. In addition, any of the changes in commercial fish production attributable to management on the Tongass will not have a significant effect on Pacific Rim fish prices. The Tongass is considered a price taker, rather than a price setter, for commercial fish harvests.

Recreation

Recreation use has been steadily increasing on the Tongass over the last ten years (Table 3-271). The largest component of recreation use has been in the Semi-primitive Motorized Recreation Opportunity Spectrum (ROS) category. These areas primarily include natural appearing shorelines, lakes, and rivers which provide for semi-primitive experiences, however due to motorized boat and/or floatplane traffic, they are considered motorized. This category comprised 60 percent of the total recreation use between 1977 and 1987. When made uniform (normalized) to account for yearly fluctuations, recreation use in this category increased 45 percent during the same ten year period.

The next largest component of recreation use is the Primitive and Semi-primitive non-motorized ROS classes. Recreation use in these classes utilize a natural or natural appearing setting with little evidence of human and no motorized use. Use of these areas comprised 20 percent of the total recreation use between 1977 and 1987. Despite lower total use figures, this category of recreation use experienced the largest percentage increase. Once normalized for yearly fluctuations, these ROS classes experience a 54 percent increase between 1977 and 1987.

The smallest component of total recreation use comes from the Roaded Natural, Roaded Modified, and Rural ROS classes. Recreation use in these classes utilize environments which contain roads and where signs of human use are evident. These ROS classes comprised 18 percent of the total recreation use between 1977 and 1987. However, recreation use in these ROS classes has also been increasing. Once made uniform (normalized) to account for yearly fluctuations, recreation use in these classes increased 39 percent from 1977 to 1987.

Despite the steady increase in use for all ROS classes, it should be noted that there have been some large fluctuations in historic recreation use. These fluctuations have likely occurred due to a variety of reasons including weather, gasoline shortages, ferry strikes, fear of international terrorism, and other related national and international events.

Table 3-271

Historic recreation use by ROS Class (recreation visitor days per year)

Year	Primitive & Semi-primitive Non-motorized Actual Use	Primitive & Semi-primitive Non-motorized Normalized Use	Semi-primitive Motorized Actual Use	Semi-primitive Motorized Normalized Use	Roaded Natural Roaded Modified & Rural Actual Use	Roaded Natural Roaded Modified & Rural Normalized Use
1977	218.4	298.9	754.4	947.6	205.4	271.0
1978	501.7	314.6	1486.4	989.9	437.5	281.3
1979	309.7	331.9	1006.9	1036.5	276.2	292.7
1980	282.5	349.2	864.0	1083.0	244.2	304.1
1981	302.7	366.5	959.5	1129.5	261.2	315.5
1982	306.0	383.8	994.0	1176.0	264.0	326.9
1983	520.6	401.1	1524.1	1222.6	439.7	338.3
1984	343.1	415.6	1008.7	1261.6	291.4	347.9
1985	621.5	430.1	1849.2	1300.6	500.5	357.4
1986	337.4	444.6	1030.2	1339.7	286.0	367.0
1987	451.5	459.1	1397.0	1378.7	327.8	376.6
Percent of Total	20%		62%		18%	
Percent Increase		54%		45%		39%

Source: USDA Forest Service Recreation Information Management (RIM) data Alaska Region, 1977-1988.

Projected future use (Table 3-272) was estimated for each category of ROS classes. Projections were considered to be a function of population in the market area. A model was developed which related past recreation use to past population. Population projections for the market area from the Bureau of Economic Analysis 1985 were used in the model to project future use. The results are displayed along with a range of likely use with a 95 percent confidence interval.

Table 3-272

Historic and projected recreation use (recreation visitor days per year)

Year	Primitive & Semi-primitive Non-motorized	Roaded Natural Semi-primitive Motorized	Roaded Modified And Rural
1977	218.4	754.4	205.4
1978	501.7	1,486.4	437.5
1979	309.7	1,006.9	276.2
1980	282.5	864.0	244.2
1981	302.7	959.5	261.2
1982	306.0	994.0	264.0
1983	520.6	1,524.1	439.7
1984	343.1	1,008.7	291.4
1985	621.5	1,849.2	500.5
1986	337.4	1,030.2	286.0
1987	451.5	1,397.0	327.8
Predicted 1995 Use	568.2	1,672.3	448.5
Range of Likely Use (95% Confidence)	165.3 - 838.7	558.3 - 2,786.3	125.3 - 771.7

Source: USDA Forest Service Demand Analysis 1991.

Table 3-273 displays how each alternative meets the anticipated demand for recreation. It displays for each category of recreation use the projected demand, capacity, and what percent of the capacity is needed in each alternative.

Primitive and Semi-primitive Non-motorized ROS Classes have sufficient capacity to meet projected use in all alternatives.

In all alternatives, recreation places in these ROS classes, if managed for timber, are assumed to lose their ability to provide a Primitive or Semi-primitive Non-motorized experience. In this event, the recreation place is either changed to a Roaded Natural/Roaded Modified recreation place (if it has ferry access) or is completely removed if no ferry access exists. Thus, those alternatives which have the highest amount of recreation places allocated to timber harvest, will show the lowest amount of recreation capacity in these ROS classes. Conversely, those alternatives which maintain the greatest amount of these recreation places in their current condition will provide the highest amount of recreation capacity in these ROS classes.

Alternative A has the highest amount of Primitive/Semi-primitive Non-motorized capacity. It provides capacity for 1,394,000 Recreation Visitor Days (RVD's), of which 41 percent will be needed to meet projected use. Alternative C has the lowest amount of Primitive/Semi-primitive Non-motorized capacity. However, it still provides capacity for 964,000 RVD's, of which 59 percent will be needed to meet projected use.

Semi-primitive Motorized ROS Class will not have sufficient capacity to meet projected use.

Alternative A has the highest amount of Semi-primitive Motorized capacity. It provides capacity for 1,296,000 RVD's, however this is still 376,000 RVD's short of the projected use of 1,672,000 RVD's. Alternative C has the lowest amount of Semi-primitive Motorized capacity. It provides capacity for 978,000 RVD's which is 694,000 RVD's short of the projected use.

Roaded Natural and Roaded Modified ROS Classes have sufficient capacity to meet projected use in all alternatives.

Alternative C has the highest amount of Roaded Natural and Roaded Modified capacity. It provides capacity for 2,779,000 RVD's, of which 16 percent will be needed to meet projected use. Alternative A has the lowest amount of Roaded Natural and Roaded Modified capacity. However, it still provides capacity for 1,341,000 RVD's, of which 33 percent will be needed to meet projected use.

Table 3-273

Relationship of projected use to future capacity for recreation and tourism by alternative

	Alternative				
	A	B	C	D	P
Primitive & Semi-primitive Non-motorized ROS Classes (RVD's)					
Projected Use	568,000	568,000	568,000	568,000	568,000
Potential Capacity	1,394,000	1,352,000	964,000	1,130,000	1,012,000
Percent of Capacity Used	41%	42%	59%	50%	56%
Semi-primitive Motorized ROS Class (RVD's)					
Projected Use	1,672,000	1,672,000	1,672,000	1,672,000	1,672,000
Potential Capacity	1,296,000	1,291,000	978,000	1,072,000	1,003,000
Percent of Capacity Used	100%	100%	100%	100%	100%
Roaded Natural & Roaded Modified ROS Classes (RVD's)					
Projected Use	449,000	449,000	449,000	449,000	449,000
Potential Capacity	1,341,000	1,456,000	2,779,000	2,240,000	2,657,000
Percent of Capacity Used	33%	31%	16%	20%	17%

Source: USDA Forest Service FORPLAN Analysis, Revision Data base

Subsistence

Regional Affected Environment

Changes Since the DEIS

The evaluation of likely potential effects of alternatives on subsistence has changed since the 1990 Draft Environmental Impact Statement (DEIS). For the 1990 DEIS, subsistence was analyzed and effects were displayed for 51 Geozones within the plannning area for the Region as a whole.

For the Supplement, evaluation of likely potential effects on subsistence is displayed by each of the 191 Alaska Department of Fish and Game Wildlife Analysis Areas (WAA's) for the first, second and fifth decades. This analysis is conducted for each of 33 communities within the Tongass National Forest. The Subsistence and Community Lifestyles section, which follows this regional overview of subsistence, includes a community-by-community analysis of subsistence effects.

WAA's average 9,000 acres in size as compared with Geozones at an average of 33,000 acres. Consequently, subsistence analysis for the Supplement is conducted on smaller areas. This approach was supported by the Alaska Department of Fish and Game, Division of Subsistence (December 14, 1990 memorandum).

For the 1990 DEIS, Tongass Resource Use Cooperative Survey maps were aggregated to form maps illustrating "important" subsistence use areas for each community. If an individual, household, or community identified an area as reliable for producing resources and as an area frequently used, that entire area (Geozone) was assumed to be an "important" subsistence use area. If a portion of a Geozone was identified as being "important", the entire Geozone was considered "important."

For the Supplement, Tongass Resource Use Cooperative Survey maps were again aggregated to form a Regional coverage. However, only the specific areas ever used to hunt deer are mapped. These areas are further identified as being used by 1 to 10 households, 11 to 50 households, 51 to 100 households, or greater than 100 households.

Background

Subsistence hunting, fishing, trapping and gathering activities represent a major focus of life for many Southeast Alaskan residents although nearly two-thirds of Southeast Alaska's population resides in urban communities. Some individuals participate in subsistence activities to supplement personal income and provide needed food. Others pursue subsistence activities to perpetuate cultural customs and traditions. Still others participate in subsistence activities for reasons unconnected with income or tradition. For these individuals, subsistence is a lifestyle reflecting deeply held attitudes, values and beliefs.

Historically, with exception of government, the socio-economic environment of Southeast Alaska has been dominated by resource-related industries such as mining, commercial fishing, timber harvesting and, most recently, tourism. Employment in these industries is highly seasonal. Salmon return to spawn in the late spring, summer, and early fall. Snow and darkness prohibit much work in timber harvesting and mineral exploration during winter months. The tourism season coincides with summer, generally running from May through early September.

Resource-related industries are also heavily dependent on increasingly global market cycles. For example, when prices are relatively high for wood products, higher levels of employment result. However, during recessionary periods, Southeast Alaskans working in resource industries often experience higher levels of unemployment than the national average.

Within this context of seasonal and cyclical employment, subsistence harvest of fish and wildlife resources takes on special importance. The use of these resources may play a major role in supplementing cash incomes during periods when the opportunity to participate in the wage economy is either marginal or nonexistent. Due to high prices of commercial products provided through the retail sector of the cash economy, the economic role of locally-available fish and game takes on added importance.

In addition to the economic importance of subsistence resources to rural households, the opportunity to participate in subsistence activities reinforces a variety of cultural and subcultural values in both Native and non-Native communities. For example, distribution of fish and wildlife contributes to the cohesion of kinship groups and to community stability through sharing of resources derived through harvest activities. Subsistence resources provide the foundation for Native culture, ranging from the totemic basis of clan divisions, to norms governing the distribution of wealth in potlatch ceremonies, to reinforcement of basic values of respect for the earth and its resources (Glass, Muth, and Flewelling, in press; Muth and Glass, 1989).

The harvest of fish and game plays important socio-cultural roles in non-Native communities as well. Among other things, it contributes to the self-reliance, independence, and ability to provide for oneself: values that social surveys indicate are important reasons why many non-Native people emigrate to or remain in Southeast Alaska (Alves, 1979).

Subsistence Defined

Subsistence is vital to those Southeast Alaskans whose use of wild resources is critical to supporting their income, culture, or lifestyle. While there are a variety of cultural, popular and sociological definitions and interpretations of subsistence, Congress addressed this subject in Title VIII of the 1980 Alaska National Interest Lands Conservation Act (ANILCA). Section 803 of the Law defines subsistence use as "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade." ANILCA provides for "the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands." It also legislates that "customary and traditional" subsistence uses of the renewable resources "shall be the priority consumptive uses of all such resources on the public lands of Alaska." Court findings on the State's interpretation of ANILCA requirements have resulted in radical changes in State and Federal roles and responsibilities regarding subsistence management in Alaska.

Changing State and Federal Roles and Responsibilities

Under ANILCA, the State of Alaska was to continue to manage the use of fish and wildlife, provided that it enacted subsistence laws which were in compliance with the Act. In May 1982, the Secretary of Interior determined that the State's subsistence program, including the limitation of subsistence preference to rural residents, was consistent with ANILCA's requirements. Consequently, the State could regulate subsistence use on Federal public lands. However, in February 1985, the Alaska Supreme Court, in Madison v. Alaska Department of Fish and Game, ruled that under State statute the subsistence preference must be extended to both rural and urban residents. As a result, the Secretary of Interior, in September 1985, informed the Governor of Alaska that the State was no longer in compliance with ANILCA. The State was advised it had until June 1, 1986 to bring its program back into compliance with federal law.

Just prior to the June deadline, the State legislature amended Alaska law regulating subsistence and the State revised its program. As a result, the Secretary of Interior determined, in November 1986, that the State's subsistence program was once again in full compliance with ANILCA. The State continued its traditional role in the regulation and management of subsistence uses on public lands until December 1989, when the Alaska Supreme Court, in the McDowell v. State case, ruled that the rural preference in the State subsistence law violated the Alaska Constitution. The Court stayed the effect of the decision until July 1, 1990.

The State considered several different alternatives, but no legislation was passed that would bring it back into compliance. On July 1, 1990, the Federal government, through the Federal Subsistence Board, implemented Temporary Subsistence Management Regulations for Public Lands in Alaska, and assumed responsibility for subsistence on Federal public lands.

State of Alaska. When the Alaska Supreme Court stay expired in July 1990, the State initiated action to alter its existing fish and game regulations. All Alaskan residents are now eligible for subsistence priority on State public lands. Previously, subsistence was open to rural residents only. Also, a tier system is in effect. When fish or game populations are adequate there is no need to prioritize among users. This is called Tier I. However, when there are too many hunters for the resource, non-resident use is eliminated. If further restrictions are necessary, a Tier II System is activated where resident sport hunting is eliminated and subsistence permits are allocated to Alaskan residents based on a complex point system. The highest points are given to those residents with: Customary and direct dependence on the particular resource; local residency; and lack of alternative resources. Because all Alaskan residents are now eligible for subsistence hunting and fishing on State public lands, increased pressure from urban residents has resulted in shortened subsistence seasons, reduced bag limits, and in creation of several Tier II subsistence hunts. None of the Tier II hunts took place in Southeast Alaska.

Federal Subsistence Board. The Federal Subsistence Board is comprised of regional or state directors of the Fish and Wildlife Service, National Park Service, Bureau of Land Management, Bureau of Indian Affairs, Forest Service, and the Regional Solicitor. The Board will continue to operate the Federal Subsistence Program through the temporary regulations. These regulations govern subsistence hunting and fishing on Federal public lands in Alaska until final regulations are implemented. More specifically, on Federal public lands, these regulations:

- define which uses are traditional and customary for fish and wildlife resources,
- define which fish and wildlife species are subsistence species,
- define which communities are rural and which communities have traditional and customary uses of individual species,
- allocate harvest levels of fish and wildlife resources between subsistence users and non-subsistence users, and
- obtain necessary information on subsistence resource uses to accomplish its responsibilities.

These regulations will continue to be revised in response to new data and legislation. A draft of the environmental impact statement will be released for public review by October 1991, with the final due by May 1992. The final Federal Subsistence Regulations are scheduled to be implemented July 1, 1992.

U.S. Forest Service. Forest Service responsibilities are detailed in the Subsistence Management and Use Handbook (FSH 2609.25). Summarizing, the Forest Service is responsible for:

- management of habitat; providing habitat for fish, wildlife and other subsistence resources used on National Forest lands,
- maintaining and managing for access opportunities,
- evaluating all activities for their effect on subsistence uses and opportunities as mandated in Section 810 of ANILCA, and
- obtaining necessary information on subsistence resource uses to accomplish its responsibilities.

The Forest Service has treated subsistence as an activity and not a resource in its management of the National Forest. This type of management can be compared to that of management for sport and commercial uses of the resources. Protection of and access to subsistence resources such as salmon, deer, moose and other species and traditional gatherings has been attained by maintenance of habitat for each species. All management prescriptions for the Tongass Land Management Plan Revision provide for the protection of and access to resource habitat.

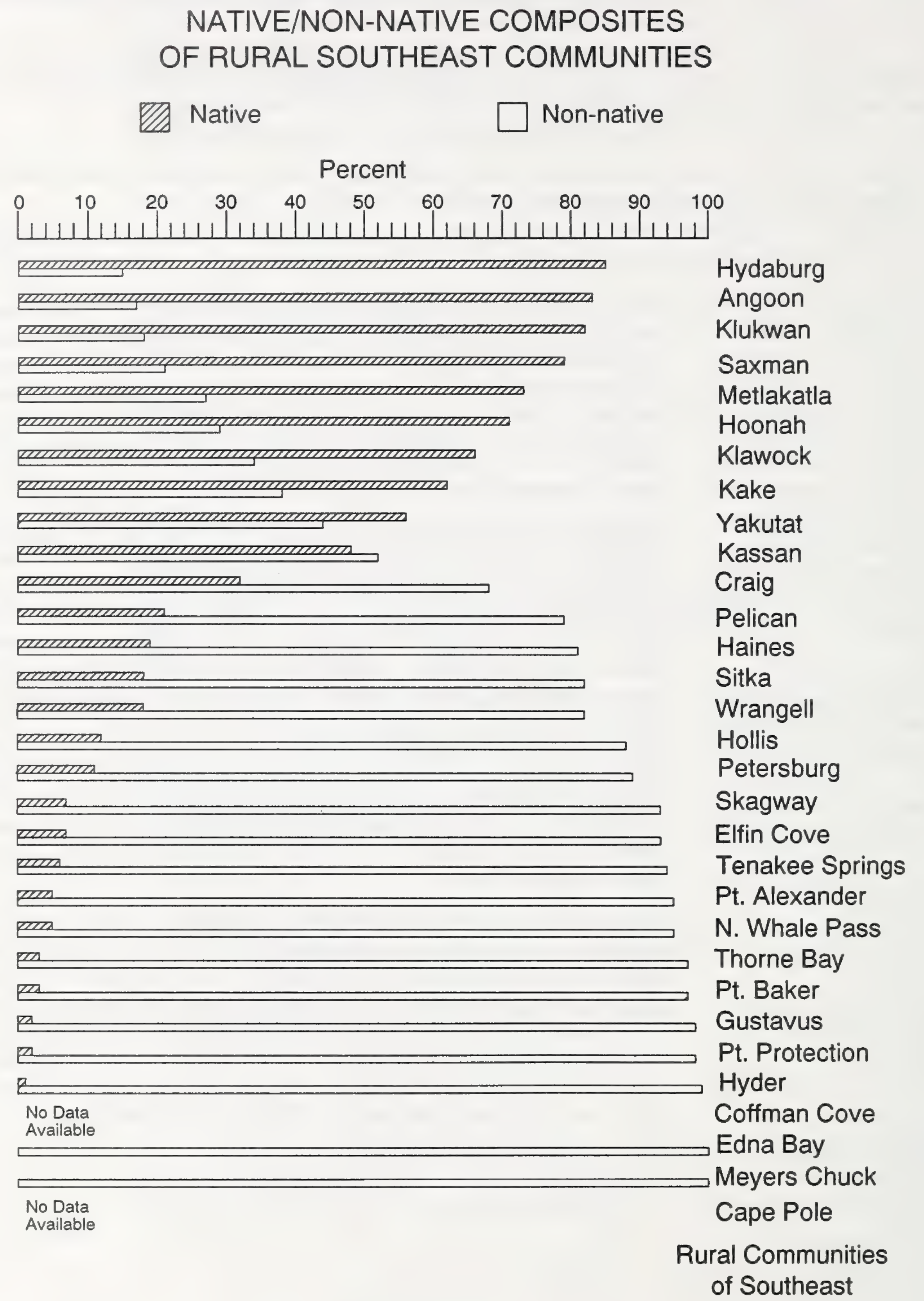
Historic Subsistence Use

Native Cultural Ties. Thousands of years ago, Alaska was settled by people seeking the most abundant fish and wildlife resources. Villages and camps were established where access to these wild resources was dependable and convenient. Until relatively modern times, most of the necessities of life came from the land and its natural products, or from trade with adjacent neighbors. Rules governing life among villagers were derived from a combination of cultural, traditional, and spiritual beliefs, which developed over long periods of time (ADF&G, Historic Methods for Harvesting Non-Commercial Salmon in Southeast Alaska, February 1989).

The introduction of cash by Russian traders beginning in the 1700's signaled change in the subsistence way of life. Cash transactions allowed Native Alaskans to take advantage of technology and provide a buffer against periods of low food supply. Following World War II, and more precisely at the time of statehood around 1959, jobs opened up and many rural Alaskans began to experience a cash economy. Today, many subsistence users earn wages sometime during the year.

Legal challenges, increased competition from other users of the National Forest, introduction of other cultures and races into the one-time predominantly Native societies, alternative food sources, transportation improvements, and increases in jobs and income have prompted Native residents of Southeast Alaska to actively protect subsistence rights of Alaskan Natives. The Native Alaskan population represents 23 percent of the population of Southeast's 31 rural communities (Figure 3-64). The importance of subsistence rights is of paramount concern to this segment of the region. "Survival of the hunting and fishing rights is the most vital link to the survival of the State's Native people and their cultures (Mallot, 1989)."

Figure 3-64



Source: Draft Subsistence Use of Renewable Resources, 2/89
Rural Community Profiles, 2/89

The continuation of Native cultures and customs is increasingly difficult as dependency on natural resources decreases. As with Native Americans of the contiguous 48 states, a close bond between natural resources of the land and cultural commitments of the people provides a continuance of the culture. With the advent of alternative food sources, transportation, education, and other changes, the tie to the land has gradually decreased, threatening the future existence of Native cultures. In Southeast Alaska, with legislation, court proceedings, and alternative supply sources, the Alaska Native is suffering the same loss of bonding to the land. To preserve cultural ties and dependency on the land, the demand for the right to subsist is paramount to Native leaders of Southeast communities.

Native Clan Boundaries. According to Oberg (1973) and others, the basis for property ownership among the Indians of Southeast Alaska was the local clan division. Clan property often consisted of salmon streams, hunting grounds, berry patches, sealing rocks, trapping areas, and other resource hunting and gathering locations. Clan membership, determined by family (matrilineal) descent, established the relationship of an individual to clan property held in common. As Krieger (1927) has observed, the entire territory adjacent to Native communities in Southeast Alaska was portioned out among the resident families or households as hunting, fishing, and berrying grounds. These lands were generally passed down from generation to generation, and the privilege to hunt, fish, or to gather berries belonged only to those individuals having ownership rights under Native law. Permission from the clan exercising property ownership was necessary before members from other clans could "legally" use the land.

Beginning in the late 1800's, non-Native migration and institutional development in Southeast Alaska resulted in population increases, establishment of new communities and expansion of existing ones, and boom-and-bust economic cycles based on a variety of resource-extraction activities (Muth, 1989). Clan boundaries and Indian property rights, as well as most other elements of Native culture, were foreign to the culture of the non-Native settlers increasingly populating Southeast Alaska. New settlers, who competed for fish and wildlife resources both for household consumption and for sale in the cash economy, were often unaware of or disregarded the Native culture's traditional clan boundaries. They used whatever lands were available, and competition for resources rose dramatically (Drucker, 1965). Even so, Native customs and laws continued to govern the landownership and use patterns of the indigenous peoples of Southeast Alaska. According to Goldschmitt and Haas (1946):

> "The Natives had a well-defined system of property ownership which was not unlike our own, except that the land was generally held in the name of a clan or house group, with joint usage by such an extended family. Title to land was obtained by inheritance or as legal settlement for damages; it was never bought or sold. It was recorded in the minds of all interested parties by elaborate ceremonials and the distribution of goods among the people (potlatches), which were necessary before land ownership could be recognized. Deeds were sometimes further recorded in the carvings of the famous totem poles." (p. iv)

Goldschmitt and Haas (1946) identified the land-use patterns associated with Native communities that existed in the mid-twentieth century in Southeast Alaska. Comparing these maps with information from the 1987 Tongass Resource Use Cooperative Survey (TRUCS) maps and from village meetings, it appears that hunting and fishing use by Natives in Southeast Alaska is still governed to some extent by traditional Native laws which define who may hunt and fish on which lands. Despite the introduction of technological innovations (such as large, modern boats) that would allow residents of Native communities to range much greater

distances than in earlier periods, their use appears to be confined to locations generally conforming to traditional clan landownership boundaries. The distribution of harvest locations for non-Native communities, on the other hand, is often apt to range over greater areas.

While areas used today by Southeast Natives follow to some extent traditional boundaries, it is important to note that further study is needed to determine whether these areas are used simply because of clan boundaries or because this is where subsistence resources are most plentiful. Regardless, Native leaders have expressed the need for legitimizing clan boundaries and providing for subsistence needs of Southeast Alaska's Native villages.

Resource allocation and land management activities should be sensitive to traditional clan boundaries to ensure the availability of resources for all Native groups. For example, if the traditional subsistence hunting areas of one clan are prescribed for other uses (such as recreation development and timber harvest), then the clan potentially impacted by the decision is left with little choice but to either modify subsistence harvest or encroach on the traditional use areas of other clans. Through time, the inviolability of clan-related land use customs will be lost, increasing inter-group conflicts and further eroding the basis of Native culture in Southeast Alaska.

Current Subsistence Use

Who Subsistence Users Are. There is now a discrepancy between how federal law and state law defines who subsistence users are.

The federal subsistence law clearly states that only rural Alaska residents qualify for subsistence hunting and fishing on federal lands. Alaska residents living in urban areas can harvest under sport, personal use, or commercial regulations, but not under subsistence regulations. The rural preference is contained in ANILCA.

Until December 1989, the State's subsistence law, like federal law, permitted only rural residents to qualify for subsistence hunting and fishing. However, the Alaska Supreme Court ruled in McDowell v. State of Alaska that the rural provision was not permissible under the Alaska Constitution. Consequently, every Alaska resident qualifies as a subsistence user on State lands.

Since residents must be from rural areas to qualify for subsistence harvests on federal public lands, the Federal Subsistence Board developed a new definition of "rural area." The definition is based on population and other socio-economic characteristics. If the state is able to resume management under ANILCA, the federal definition will likely become the new standard for the state, as the state's definition of rural area (based on socio-economic characteristics and not population size) was rejected by the federal court in the case, Kenaitze Indian Tribe v. State of Alaska.

Southeast Alaska has a population of slightly less than 65,000 people. Most of this population is located in 33 established communities, with Juneau and Ketchikan accounting for approximately 60 percent of the Regional population. Juneau and Ketchikan, the only two designated urban communities in Southeast, do not qualify for subsistence use on federal public lands under current federal laws and regulations. Sitka, Petersburg, and Wrangell account for 22 percent of the Regions total population. Most of the remaining 18 percent of Southeast Alaskas population live in 28 small communities throughout the Region (ADF&G, Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1989).

In addition to permanent communities, there are numerous floating and land-based logging camps across the Tongass National Forest that are large enough and have existed long enough to have an effect on local uses of fish and wildlife. Camp residents appear to be split between Alaska residents and non-residents alike who leave Alaska when the working season is over (ADF&G, Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1989).

A relatively small number of Southeast residents live at remote isolated locations. These include people living at homesites throughout Southeast, at summer fishing sites along the outer coast, tree thinners camped near areas where they have Forest Service contracts, trappers, people living on floathouses in the southern part of the Alexander Archipelago, and people living on fishing boats. This diverse group is typically transient, generally has very low cash income and is closely tied to non-commercial harvest of fish, game, and other renewable natural resources.

As in other parts of Alaska, Southeast's population grew with expansion of government services following the oil boom. In recent years, however, the population has stabilized. A number of new communities are evolving around state land selections or timber harvesting activities. Edna Bay, Coffman Cove, North Whale Pass, Thorne Bay and other small Prince of Wales Island communities are examples.

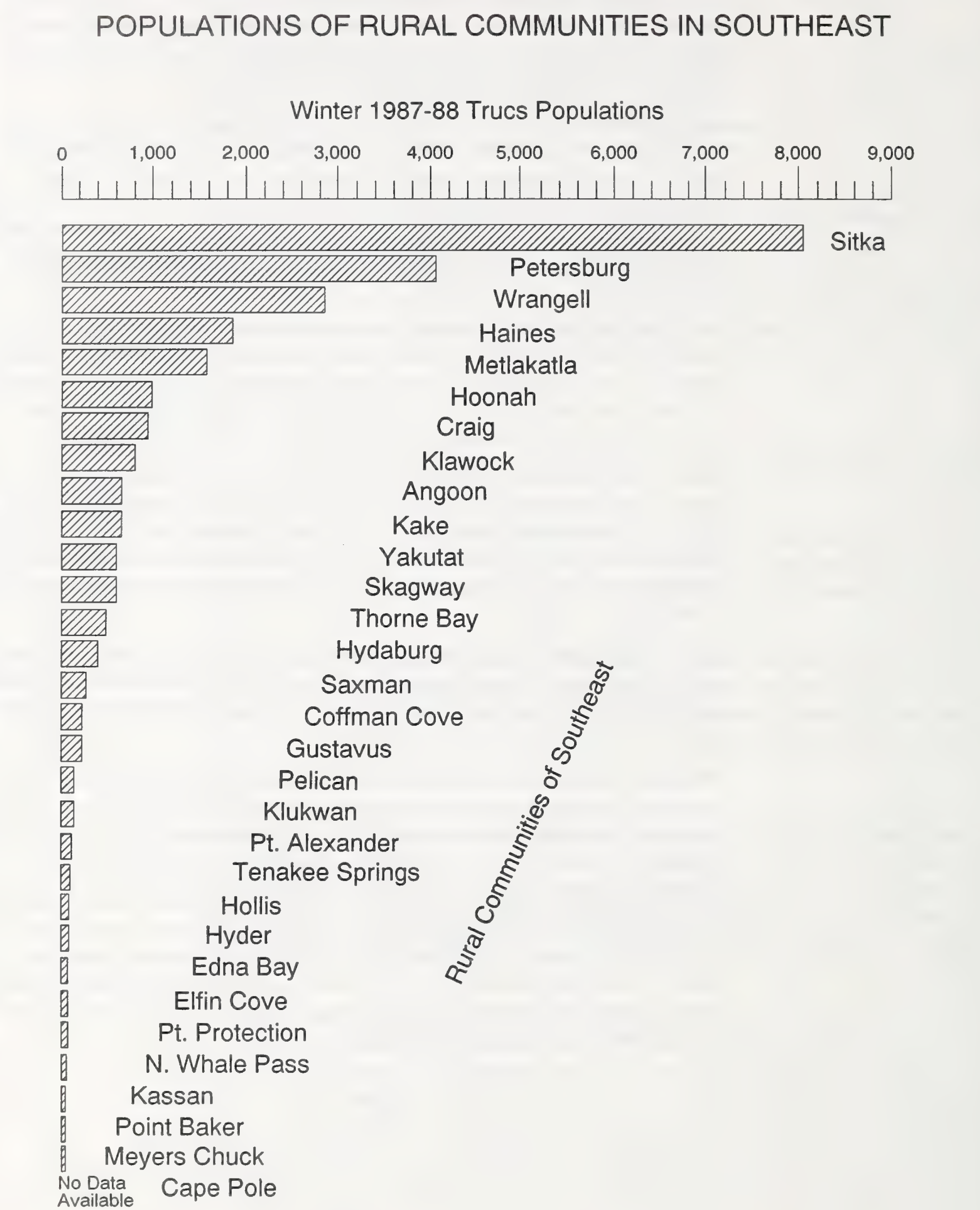
Of the 25,500 people in Southeast Alaska's rural communities, seven percent (1,572 people) lived in 17 villages having fewer than 100 occupied households in the winter of 1988. One third (9,000 people) of all rural residents live in the 11 communities of between 100 and 999 occupied households, and another quarter (6,875 people) live in Wrangell and Petersburg, each having approximately 1,000 households. Finally, one in three rural residents live in Sitka (Kruse, 1990).

Figure 3-65 identifies the rural communities of Southeast Alaska. All have subsistence rights as defined by the rural designation developed by the Federal Subsistence Board. All but Juneau and Ketchikan are included in the rural community designation. Juneau and Ketchikan are designated as non-rural, or urban, developments.

The median 1987 family income in rural Southeast Alaska was $37,500 (Figure 3-66) as compared with a U.S. median family income in 1987 of $30,853 (USDC, 1988). In addition to the income generated by Southeast's rural residents, substantial public services are subsidized through government programs or provided by Native Corporations (Kruse, 1990).

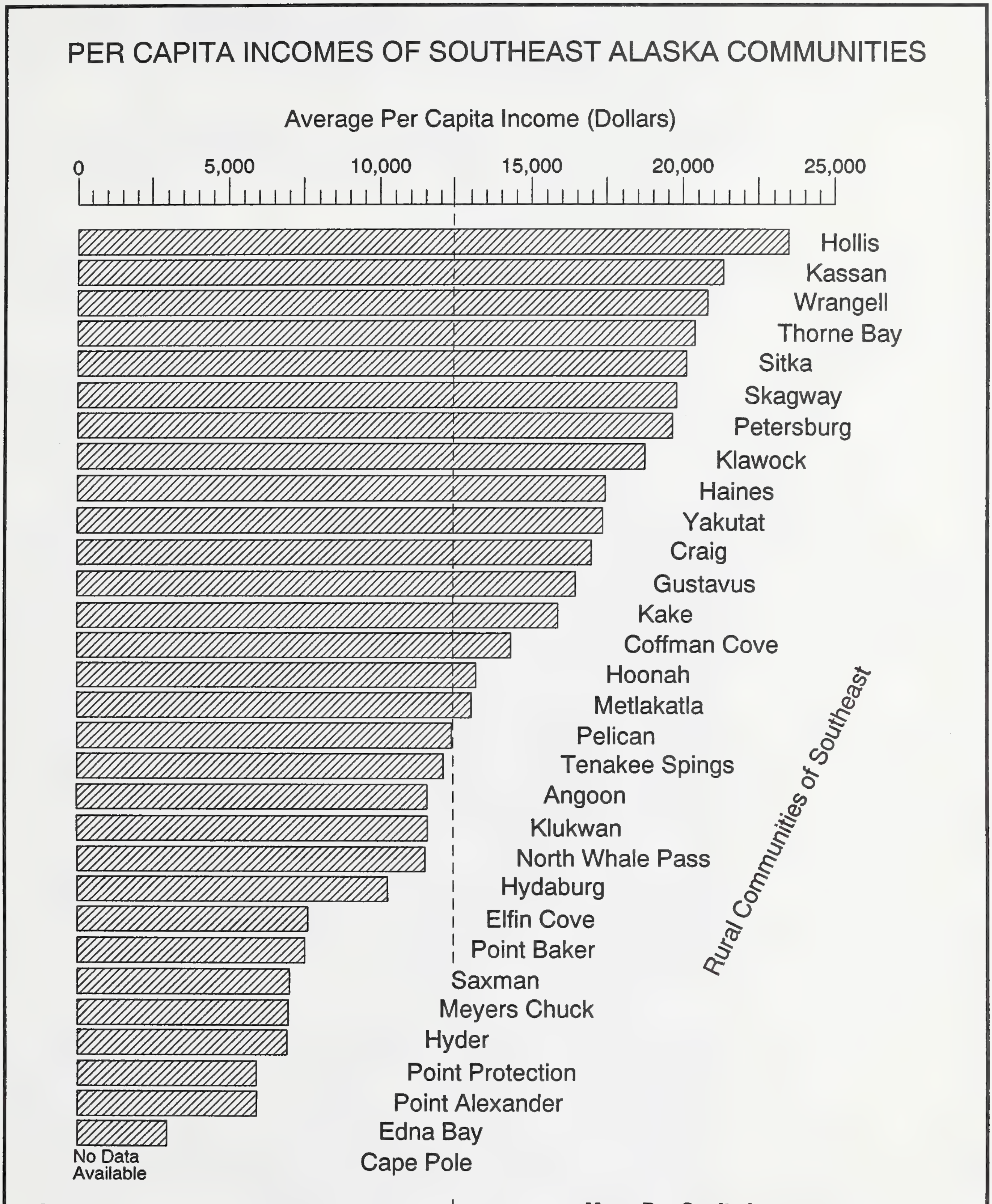
Viewed from another perspective, incomes of Southeast Alaskan residents living in rural communities appear relatively low. The 1988 mean per capita income for all Alaskans was $19,088 (USDC, Bureau of Economic Analysis, 1988), but for Southeast Alaska only ws $22,445. (Mean per capita income for the United States was $16,510.) However, one in six rural Southeast households had per capita incomes less than $5,000. The maximum income for these households (in 1987) was $20,000 (Kruse, 1990).

Figure 3-65



Source: Draft Subsistence Use of Renewable Resources, 2/89
Rural Community Profiles, 2/89

Figure 3-66



Source: Draft Subsistence Use of Renewable Resources, 2/89
Rural Community Profiles, 2/89

Amount of Subsistence Harvest

Eighty-five percent of rural Southeast households harvest subsistence food (Kruse and Muth, 1990). In 1987, half of all households (51 percent) reported harvesting more than 80 pounds of edible subsistence product per capita. A quarter of all households harvest more than 250 pounds per capita (Kruse, 1989).

Figure 3-67 identifies individual community harvest of subsistence resources in terms of fish and game. Almost one-third of households obtain at least half of their food from their own harvest activities. About 40 percent of all households get at least a quarter of their food from subsistence harvest activities (Kruse, 1989).

Residents not only use subsistence products for much of their food, they also tend to harvest many types of subsistence resources. More than half of all households (61 percent) harvested at least four different types of fish, wildlife, and/or plant resources in 1987. One in ten households harvested more than 10 different types of resources (Kruse, 1989).

The use of subsistence resources in Southeast cannot be explained simply in terms of household harvest and consumption. Most subsistence harvesters give at least part of their harvest away. In 1987, a third of all households in rural Southeast Alaska gave away at least four different types of resources. Approximately two-thirds of the households reporting that they gave no resources away, did not harvest any resources themselves.

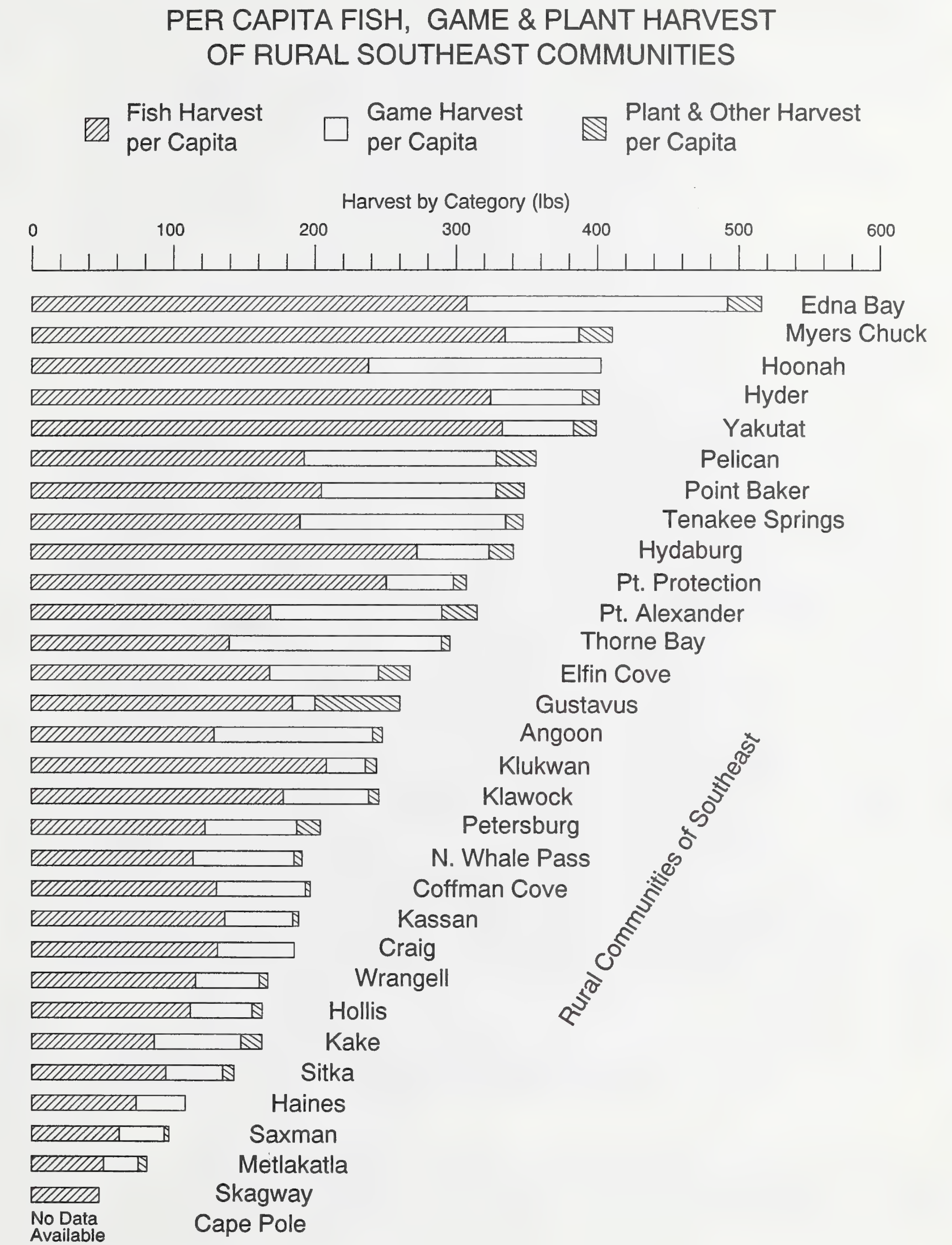
What Subsistence Users Harvest. In terms of useable resources provided by the natural environment, Southeast Alaska is a land of abundance. In all, TRUCS (USFS, Tongass Resource Use Cooperative Survey, 1988) found forty-two different resource categories harvested for personal use. This variety provides opportunities for diverse diets, depending on individual tastes and preferences. The availability of subsistence resources is not uniform throughout Southeast. The uneven distribution of subsistence resources may, in part, explain variations in the diversity of harvest activity among rural Southeast's communities. Edna Bay subsistence resource harvesters gather the most diverse number of resources, while residents of Skagway harvest the least. Geographic differences in the richness of the resource base may explain community differences both in the mean per capita harvest and percent of protein from such harvests. In addition to the geographic aspects of the land base, harvest regulations and other sociocultural considerations are also factors that determine levels and diversity of resource harvest (Kruse, 1990).

The diversity of resource harvest activities does not vary greatly by size of place, income, length of residence, or ethnicity. Forest-wide, however, there is a slight tendency for households located in small communities, and households with lower incomes, to harvest a greater variety of resources than other households. Figure 3-68 identifies the resources used by the rural communities of Southeast Alaska.

Figure 3-68 has been developed primarily from the information supplied in the Tongass Resource Use Cooperative Survey. Supplemental information and verification of information supplied from the TRUCS data has been obtained from Alaska Department of Fish and Game, Division of Subsistence, Technical Reports for the communities of Angoon, Haines, Klawock, Kluckwan, Petersburg, Sitka, Skagway, Tenakee Springs, Wrangell and Yakutat. These technical reports provide site-specific detail related to the communities from which information was gathered while the TRUCS information is by community and related Southeast-wide.

Where Subsistence Harvest Occurs. Historically, subsistence use occurred where access to the resources cost less in energy than the resources gathered. Many of the gathering activities occurred in easily-accessed areas. These activities occurred close to settlements where they

Figure 3-67



Source: Draft Subsistence Use of Renewable Resources, 2/89
Rural Community Profiles, 2/89

Figure 3-68

RURAL COMMUNITIES RESOURCE USE

Resource	Cape Pole [4]	Meyers Chuck	Kasaan	North Whale Pass	Point Baker	Elfin Cove	Edna Bay	Port Protection	Hollis	Port Alexander	Hyder	Klukwan	Tenakee Springs	Gustavus	Coffman Cove	Saxman	Pelican	Hydaburg	Angoon	Thorne Bay	Yakutat [1]	Kake	Skagway	Hoonah	Klawock	Craig	Metlakatla	Haines	Wrangell	Petersburg	Sitka
Wildlife																															
Deer	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Moose		●		●			●				●					●	●			●	●				●	●		●	●	●	
Mountain Goat											●									●	●		●					●	●		●
Black Bear				●	●		●	●	●	●	●	●						●		●	●		●	●	●	●		●	●	●	●
Brown Bear [2]																															
Waterfowl		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Seabirds		●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Furbearers		●	●	●		●	●	●	●	●	●		●	●	●		●			●	●		●	●	●	●	●	●	●	●	●
Small Game		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●		●	●	●	●	●	●	●	●	●
Fisheries																															
Salmon		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Other finfish		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Invertebrates		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Marine Mammals																															
Harbor Seal			●	●						●	●	●	●		●	●	●	●	●		●	●		●	●	●	●			●	●
Other mammals		●					●		●				●				●							●			●			●	●
Plants																															
Beach greens		●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●
Seaweed		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Berries		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Firewood		●	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Green Timber		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Roots																								●	3						

SOURCE: Subsistence Use of Renewable Resources by Rural Southeast Alaska Residents, Draft 2/1989

[1] Fish and Wildlife Use in Yakutat Alaska, 5/86
[2] No Data Collected Specific to Subsistence Use
[3] Hanlon v. Barton
[4] No Data Available

could be accessed by foot or boat. Over time, as new technology developed, ease of access meant a movement outward into new resource use areas. The motorboat and development of road systems associated with logging activities in Southeast Alaska have had perhaps the greatest influence on subsistence gathering activity. Today, all communities may be accessed by motorized boats and many are tied to interior lands by road systems. As new roads are developed, subsistence use moves from areas with higher access costs to areas with easily-achieved access.

The Subsistence Map showing “Areas Ever Used for Deer Hunting by Southeast Alaska Subsistence Communities”, shows that the road systems are extensively used. This is particularly true on Prince of Wales Island.

One can see from the Subsistence Map that, in addition to making heavy use of the road system, subsistence use is concentrated in close proximity to individual communities and along the beaches. Each community throughout Southeast Alaska has distinct home ranges with concentrated use occurring in these home ranges. A wide range of use on a less concentrated scale exists outside the normal home range. More than half (54 percent) of all households in rural Southeast Alaska travel a minimum of 11 miles by boat to reach the one reliable deer hunting area that they chose to describe in the Tongass Resource Use Cooperative Survey (Kruse and Muth, 1990). An additional 18 percent of all households also use boats to reach their reliable deer hunting area, but travel shorter distances (10 miles or less) (Kruse and Muth, 1990). Only 15 percent of all households use cars or trucks to travel to most reliable areas (Kruse and Muth, 1990). Thirteen percent use some other form of transportation, such as airplanes, walking, all-terrain vehicles, and the Alaska Marine Highway System (Kruse and Muth, 1990). While the majority of use occurs within about a 15-mile radius of rural communities, the Subsistence Map shows that nearly all of the forested lands of the Tongass are used to some degree for subsistence deer hunting (ADF&G Technical Report Numbers 39, 71, 90, 95, 126, 131, 138, 159, 164, and 165). Appendix K displays, by community, the individual Wildlife Analysis Areas that were ever hunted for deer.

Kruse and Muth (1990) found that nearly one-half of the households harvesting deer mentioned the existence of clearcuts of various ages occurring in presently reliable areas (44 percent), most-often-used areas (48 percent), and areas no longer used (55 percent). They also reported that old-growth forests were mentioned as most reliable by 90 percent of households harvesting deer, were most-often-used areas by 91 percent of households and were areas no longer used by 90 percent of those households harvesting deer.

While Kruse and Muth (1990) could not assume that the differences in physical attributes between current and abandoned deer harvest areas reflect the reason why residents stopped hunting in the abandoned areas, respondents did offer reasons for abandoning certain areas. One-third of all households that ceased hunting in one or more deer harvest area said that they did so because of an absence of deer in the area. One-fifth of all households stopped using an area because there were too many hunters. Likewise, a fifth mentioned that an area was closed to hunting. About one in ten households said that the area was inconvenient to reach, that it had been logged, or that they had no means to get to the area any longer.

Abundance and Distribution

Wildlife. Wildlife populations for deer, moose, mountain goat, black and brown bear, furbearers and small game range from low to high across Southeast. Trends in population levels for all species range from stable to increasing (USDI, Subsistence Management and Use, 3/88).

Sitka black-tailed deer are important subsistence resources for Southeast Alaska's rural residents. In 1987, deer constituted 21 percent of the total pounds of subsistence resource harvested by rural residents with an estimated 11,600 deer being harvested by 3,000 households. Over one-third (37 percent) of all rural households harvested at least one deer (Kruse, 1989).

Deer harvest levels vary substantially by community. Residents of Edna Bay, Port Alexander, Pelican, Tenakee Springs, Hoonah, and Angoon harvested an average of 250 pounds (80 pounds of useable meat per deer) per household in 1987. These communities are in close proximity to prime deer habitats with healthy deer populations. Liberal regulations have allowed relatively high harvest levels. Harvest levels were understandably lower in communities located away from areas of high deer populations (Kruse, 1989).

"Land mammals other than deer" account for only 4 percent of the total harvest of edible subsistence resources. In 1987, at least 30 percent of the households in Edna Bay, North Whale Pass, Thorne Bay, and Meyers Chuck harvested land mammals other than deer. These mammals included moose, black bear, or furbearers (Kruse, 1989).

Expressed in mean pounds, the harvest of land mammals other than deer is highest in Petersburg and Wrangell where moose was harvested by 9 and 7 percent of the households, respectively. Other land mammals were much more likely to be harvested by low income households (Kruse, 1989).

Waterfowl. Waterfowl and seabirds range throughout Southeast Alaska with population fluctuations occurring seasonally as birds migrate from summer to winter feeding grounds. Many areas lack accurate population information and population trends are difficult to identify.

In 1987, duck and geese populations which migrate along the Pacific Flyway showed decreases from their ten-year averages; declines appear to be primarily related to overharvest (USDI, Subsistence Management and Use, 3/88).

In rural Southeast Alaska bird harvest constitutes a negligible percentage of the total subsistence harvest with a third or less of the households in all communities except Edna Bay harvesting birds. Although ducks are the most important type of bird harvested, they contributed an average of only four pounds of edible meat per household per year. Households associated with the highest bird harvest levels are high income, white, and residing in Petersburg. These findings suggest that birds may be more culturally important to rural Southeast residents who grew up in areas where waterfowl hunting was a common activity (Kruse, 1989 and ADF&G Technical Report Numbers 39, 71, 90, 95, 126, 131, 138, 159, 164, and 165).

Marine Mammals. The only marine mammal harvested for its meat by rural Southeast residents is the harbor seal. Harbor seal accounts for only 3 percent of the total subsistence harvest. In 1987, 400 rural Southeast households harvested some 1,900 marine mammals including 1,500 harbor seal. The principal communities involved in the harvest of marine mammals are Angoon, Hoonah, Kake, and Yakutat. In these communities between a quarter and a third of all households harvested harbor seals in 1987 (Kruse, 1989).

The Forest Service does not have jurisdiction over the harvesting of harbor seals.

Salmon. Commercial catches of salmon statewide have been recorded in excess of 100 million fish for the seventh straight year. Between 1978 and 1985, catches for subsistence use increased steadily. (No specific data was available on subsistence harvest during the 1983-84 season). In 1985 commercial fishery users logged the all-time high harvest of 146.7 million

fish. This was substantially greater than previous records set during the 1930's when Alaskan waters and streams were unregulated (USDI, Subsistence Management and Use, 3/88).

Harvests of all salmon species constitute 21 percent of the total harvest of subsistence resources. More that 1.2 million pounds of edible salmon were harvested in 1987. More than half of all households in rural Southeast Alaska harvested at least one salmon. Substantial percentages of households in all communities harvested salmon in 1987. Species harvested by the largest percentage of households in the region as a whole were kings (42 percent) and cohos (38 percent). The 508,000 pounds of kings harvested in 1987 account for 42 percent of the total subsistence salmon harvest.

In Southeast, pink salmon are the most abundant species, but sockeye are preferred by subsistence users. Commercial net fishermen prefer pinks and chums. Although historically, many of the sockeye salmon habitats in Southeast have been highly productive, sockeye salmon are now in low supply. It is believed that overharvesting through interception by commercial fishermen prevents the salmon from reaching spawning grounds and subsistence use areas (USDI, Subsistence Management and Use, 3/88).

Numbers of chinook salmon are currently depressed all along the Southeast coast. The major chinook spawning streams are large bodies of water with high turbidity. This prevents accurate escapement counts and makes management for maximum sustained yield difficult (USDI, Subsistence Management and Use, 3/88).

Other Finfish. Finfish other than salmon account for 24 percent of the total subsistence harvest by rural Southeast residents. Sixty-one percent of all households were involved in this harvest in 1987; over half of the households in rural communities except Skagway and Metlakatla harvested at least some finfish other than salmon (Kruse, 1989).

Found throughout Southeast Alaska finfish other than salmon are comprised of halibut, cod, flounder, sole, rockfish, herring, steelhead, trout and Dolly Varden char. Halibut is the most commonly harvested finfish other than salmon with 48 percent of all households catching one or more halibut in 1987. Like salmon, halibut is a widely exchanged resource. A third of all rural Southeast households gave away at least some halibut in 1987 and half of all households received at least some halibut. Communities in which households harvest relatively high amounts of halibut include Meyers Chuck, Edna Bay, Pelican, Gustavus, and Yakutat (Kruse, 1989).

Invertebrates. Invertebrates constitute 16 percent of the total subsistence harvest in Southeast. Almost half of the rural Southeast residents harvested invertebrates in 1987. The percentage of households harvesting invertebrates varied from 10 percent in Kluckwan to 100 percent in Kasaan . The species harvested by the largest percentage of residents are clams and cockles (32 percent) and dungeness crab (28 percent). Another notable invertebrate resource is shrimp which is harvested by at least a third of all households in Edna Bay, North Whale Pass, Yakutat, Hollis, Meyers Chuck, Elfin Cove, and Hyder. Also important on a regional basis are abalone, gumboot, herring eggs, king crab, tanner crab and octopus (Kruse, 1989). All species of invertebrates range throughout the waters of Southeast Alaska. Abalone is available on the outer coasts. Except in areas of overharvest, invertebrate resource appear to be abundant with subsistence harvest being high (USDI, Subsistence Management and Use, 3/88).

Sea cucumber is an important resource in at least 13 communities. Communities in which at least 20 percent of all households harvested sea cucumber include: Hollis, Edna Bay, Point Baker, Thorne Bay, Kasaan, and Meyers Chuck. Sea urchins are important to Yakutat and Edna Bay. Scallops are harvested by at least 10 percent of all households in Edna Bay, Meyers

Chuck, Craig, and Hollis. On the average, long-term Native households harvest more invertebrates than other households (Kruse, 1989).

Plants. Over half of all rural Southeast Alaska households harvest edible plants. Plant products account for only 3 percent of the total subsistence harvest. Berries of various types make up the largest component of the plant harvest. More edible plants are harvested by the residents of smaller communities, by low income households, and by Natives (Kruse, 1989).

Firewood. Firewood is also an important component of the plant resources. Forty-six percent of all rural Southeast Alaska households harvested an estimated total of 26,000 cords of firewood in 1987 averaging three cords per household. Firewood is also a shared resource, with 13 percent of all households giving firewood away and 10 percent of all households receiving firewood (Kruse, 1989).

Summary. The historical significance of fish, wildlife, and other renewable natural resources to the residents of Southeast Alaska has been amply documented (Krause, [1885] 1956; Suttles, 1968; Oberg, 1973). The Tlingit, Haida, and Tsimshian Indians depended on the harvest and use of renewable natural resources as the basis of their way of life. The process of modernization has had tremendous impact on the aboriginal peoples of Southeast Alaska. Most importantly, the subsistence economy that characterized Southeast Alaska society during the pre-contact period has gradually given way to a mixed economy characterized by public (government) sector, private (market) sector, and subsistence sector components (Glass, 1987; Glass, Muth, and Flewelling, 1990). Among the Native peoples, subsistence activities involving fish and wildlife may not be as pervasive as they were in the past, but they have shown considerable persistence, adaptability, and stability. In addition, non-Native people in Southeast Alaska have come to depend on renewable natural resources provided by the land and waters of the Tongass National Forest to support their own version of subsistence lifestyles. Among other things, the boom-and-bust cycles of the contemporary market economy of Southeast Alaska may have served to underscore the importance of subsistence harvest, sharing, and consumption as a form of "social insurance" to guard against the uncertainties of the cash economy.

The continuing importance of subsistence resources to both Native and non-Native residents of contemporary Southeast Alaska is illustrated by two region-wide studies of resource use conducted in 1979 (the Alaska Public Survey—APS) and 1988 (the Tongass Resource Use Cooperative Survey—TRUCS). The APS survey, administered to a random sample of over 1,200 people in nearly all the communities in Southeast Alaska, posed questions about food-producing activities. Research results indicated that local, wild food resources were used extensively by Southeast Alaskan residents. As reported by Alves (1980), approximately 80 percent of the adult population in Southeast Alaska participated in hunting, fishing, or gathering (e.g., berry-picking, seaweed-gathering) activities. By means of these activities, people directly procured for themselves a sizeable portion of their own food budgets: "Our data indicate that about 80 percent of the households surveyed provided some of their own food; on the average households in the region directly supplied 30 to 40 percent of the meat, fish, and fowl consumed (Alves, 1980, p. v-3.)." In addition to resource harvest, resource sharing contributed to household food budgets as well. According to Alves (1980, V-3), through a combination of harvest and sharing, ". . . benefits of local food resources touch 90 percent of all households" in the region. This compares favorably with information (presented above on a resource-by-resource basis) collected in the TRUCS study. In analyzing data from the TRUCS study, Kruse and Muth (1989, p. 5) observed:

> Only 15 percent of rural Southeast households harvest no subsistence food. Half of all households (51 percent) reported harvesting more than 80 pounds of edible subsistence product per capita in 1987. A quarter of all households harvest more than 250 pounds per capita.
>
> Much of the subsistence harvest is directly incorporated into household diets. Almost one in three households gets at least half of the food it consumes from its own harvest activities. A total of 40 percent of all households gets at least 25 percent of its food from household subsistence harvests.
>
> Residents not only use subsistence products for much of their food, they also tend to harvest multiple types of subsistence resources. More than half of all households (61 percent) harvested at least four different types of fish, wildlife, and/or plant resources in 1987. One in five households harvested more than 10 different types of resources.

In addition, the TRUCS data confirm the continuing vitality of resource sharing in the lifestyles of Southeast Alaska residents. In analyzing the TRUCS data, Kruse and Muth (1989) found that 78 percent of the respondent households surveyed in Southeast Alaska gave fish, wildlife, and/or plant resources (e.g., berries, firewood, beach greens, etc.) to other households. And of the respondents who reported that gave no resources away, approximately two-thirds of those households—some of which may contain the elderly, the widowed, or the infirm—didn't harvest any resources for themselves either.

The Alaska Public Survey and the Tongass Resource Use Cooperative Survey confirm the continuing reliance of rural households on a wide variety of renewable natural resources provided by the Tongass National Forest. Resource management that is sensitive to subsistence not only as a legal mandate, but as a chosen lifestyle will be needed to help ensure that subsistence uses of renewable natural resources remains a viable lifestyle in Southeast Alaska.

Access

Many Southeast communities are accessible only by air and water. Only Skagway, Haines, Kluckwan and Hyder have access to the interior by road, with many other communities served by the Alaska Marine Highway System.

Roadbuilding, a byproduct of timber harvesting and to a much lesser extent mining, is an important agent of change in Southeast. These road networks provide greater access to areas previously unconnected and can affect subsistence both positively and negatively by providing access, dispersing hunting and fishing pressure, and creating the potential for increased competition. On Prince of Wales Island, for example, areas that have become road-connected are now more easily reached through the Marine Highway System, thus providing greater access from Ketchikan, one of the most populated cities in the region and considered by State regulation as non-rural in subsistence designation. While road systems tend to bring more people into an area, they also give subsistence hunters access to previously remote regions and provide a greater opportunity for subsistence harvest (USDI, Subsistence Management and Use, 1988)

Southeast Alaska is comprised of isolated islands unconnected by road systems. However, with the transportation means available (floatplanes, Marine Highway System, automobiles, boats), Southeast residents are very mobile in their subsistence resource use activities. Wrangell, the fifth largest community in Southeast, has documented their subsistence gathering from the southern tip of Prince of Wales Island to Yakutat, covering most of the islands in between (Kruse and Muth, 1989).

Competition

Southeast Alaska is a land of abundant resources, however, all the resources are not evenly distributed across the Tongass National Forest. Where the resources are confined to island groups or river systems, where access is costly or nonexistent, use of the resources is low. Where the resource is abundant, and a community is present but access by other communities is costly, the resource tends to be used primarily by the community which resides in the area. Where resources are abundant and access is available to local and other communities of Southeast, competition for the resources may exist (USFS, Tongass Resource Use Cooperative Survey, 1988).

Increased competition may result when less expensive access to the area or within the area is provided. Such is the case when road systems are established to local communities. When areas historically not utilized for subsistence purposes are made available due to easier, more cost-effective access, the new area tends to be utilized. When communities with road access to abundant resources are connected to the Alaska Marine Highway System or to commercial air services, competition for the resources may be generated from outside communities with lower abundance of the same resource.

Examples of these effects are readily available in Southeast. Chichagof Island, Prince of Wales Island, and the Yakutat Forelands at one time were isolated portions of the Tongass with limited use from communities in the vicinity. Today, road construction, primarily due to timber harvest activities, has created vast areas in each location readily available from the local community. Access provided by the Alaska Marine Highway System and small commuter planes to Chichagof and Prince of Wales Islands allows easy access by off-island communities. The Yakutat Forelands have been made readily available from the access provided by the Alaska Airlines connection to the community of Yakutat. Access to the Yakutat Forelands is perhaps one of the better contacts of the lower forty-eight to Alaska's abundant fisheries and brown bear populations.

Tenakee Springs, although not having a vehicle off-loading ramp at its ferry terminal receives increased use of its roaded connections in the Indian River drainage. This use is primarily in the form of foot traffic, but has in the past increased due to all-terrain vehicle activity. Tenakee has easy access to other roaded areas (Kadashan/Corner Bay) with access by small boat. Being close to the urban-designated city of Juneau, increased competition for resources has occurred (USFS, Alaska Lumber and Pulp Company 1981-86 and the Alaska Pulp Corporation 1986-90 Operating Period Final Environmental Impact Statements).

Competition for resources in the future is difficult to predict. The numbers of hunters and deer harvested steadily increased from 1980 to 1987, but since then the number of deer harvested has declined by 20 percent. Some areas have received heavy use. The Southeast Advisory Boards have recently noted this increased use of the resources and have recommended decreases in harvest of deer, moose, and other game species for non-rural residents. These recommendations have been recognized by the State's Game Board and implemented on areas such as Chichagof Island and the Yakutat Forelands.

Methodology and Scientific Accuracy

Evaluation of potential cumulative effects of the proposed land use designations on subsistence focuses on changes in three areas: 1) abundance and distribution of subsistence resources; 2)

access to subsistence resources; and, 3) competition from non-subsistence users for subsistence resources.

To illustrate which areas are used by which communities for subsistence purposes, the Tongass Resource Use Cooperative Survey (TRUCS) maps were aggregated to form “composite” maps. The Survey consisted of 1,465 interviews conducted in 30 Southeast Alaska communities between October 1, 1987 and March 13, 1988. All permanent communities except Juneau and Ketchikan were included in the study and separate samples were drawn for each community. Households were selected for the study to yield statistically reliable data at the community level. The Institute of Social and Economic Research (ISER) of the University of Alaska Anchorage directed the study.

The research design was a product of an earlier cooperative agreement between the U.S. Forest Service and ISER and received review by the Alaska Department of Fish and Game Division of Subsistence. The questionnaire used in the survey and a description of the sampling and analysis design were approved by the federal Office of Management and Budget. The questionnaire consists of three sections: Deer Hunting, Use of Other Resources, and Background Questions. In addition to the survey questions, a major part of the TRUCS interview was devoted to mapping subsistence harvest areas. Respondents mapped areas used to harvest deer, salmon, other finfish, marine invertebrates, and marine mammals. Information was recorded on mylar using pin-registered mylar U.S. Geological Survey 1:250,000 base maps for reference. Mapped information was digitized by ISER staff into a geographic information system database.

Prior to initiating the survey, approximately 200 formal and informal community leaders throughout Southeast Alaska were informed about the study objectives and asked for their comments about the way the survey would be conducted. The study design was modified accordingly to minimize response burden on residents and to provide local communities with additional information.

ISER research staff edited, coded, entered on computer, and verified questionnaire responses. The resulting data file was then examined by staff of the ADF&G Division of Subsistence and ISER for errors or apparent anomalies. In a few instances respondents were contacted to confirm their answers. In most cases, however, verbatim comments of the respondents recorded on the questionnaires clarified or substantiated unusual responses.

Eighty-three percent of the households randomly selected to participate in the survey completed an interview. Refusal rates for individual questions were, with minor exceptions, under one percent of all respondents. Reliability of individual data items in the study depends on the variation in responses, the type of estimate (e.g., mean or percentage), the ability of the respondent to accurately provide the information, and the size of the sample upon which the estimate is based. Individual community samples were designed to yield maximum sampling errors for dichotomous variables (e.g., yes/no responses) of plus or minus 12 percentage points at a 95 percent level of confidence. While the reliability of individual estimates varies widely, most mean harvest amounts reported at the community level for major species or species groups can be assumed to have a margin of sampling error of plus or minus 50 percent of the mean (e.d., 126 deer +/- 50 percentage points or +/- 63 deer).

Much of the data represent harvest quantities reported for the entire calendar year 1987. These data reflect the respondent’s best estimate and may be in error due to their ability to recall information. Recall errors are in addition to the sampling errors discussed above. Conversion of harvest quantities to edible pounds were made on the basis of conversion factors developed

by the ADF&G (Schroeder and Kookesh, 1988).

Only households occupied at the time the survey was conducted were eligible for selection. Since some households are occupied only during the summer or only occasionally during the year, the survey results pertain to the winter population of each community. While there is no evidence that the winter of 1987-88 was unusual, results can only be validly generalized to the population of each community in the winter of 1988. The ADF&G Division of Subsistence, in a December 14, 1990 memorandum, agreed that using data from the TRUCS surveys and from Division of Subsistence technical reports to measure subsistence harvest levels is appropriate.

Current demand for deer and other subsistence resources is presented by community by WAA for each alternative in the following chapter. See the Methodology and Scientific Accuracy section of the next chapter for an explanation of the predicted future needs for subsistence resources.

Harvestable populations of subsistence resources are determined by application of habitat capability models. This information is presented by community by Wildlife Analysis Area (WAA) by species for the first, second and fifth decades for each alternative in the following chapter. Refer to the Wildlife chapter for an explanation of the habitat capability models.

The Revision data base was used to determine if roads do or do not exist within each WAA or if a very small portion of the WAA is roaded. The Revision data base was also used to determine road access of communities to eachother.

The Revision data base and the Alaska Marine Highway Schedule (Alaska Department of Transportation) was used to determine ferry and vehicle access to communities. This information, combined with information from ADF&G Hunter Survey Statistics and the TRUCS maps was used to determine competition.

To determine the cumulative impacts of future activities on subsistence users and resources, habitat capability was compared with demand and competition for each alternative in the first, second and fifth decades. The cumulative effects caused by competition between communities is also addressed. This information is presented by community by WAA for each alternative.

Subsistence and Community Lifestyles

Affected Environment and Environmental Consequences

Changes Since the DEIS

The evaluation of likely effects of alternatives on subsistence and community lifestyles has changed since the 1990 Draft Environmental Impact Statement (DEIS). Refer to the preceeding section (Regional Affected Environment) for details regarding these changes.

Background

Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) requires a Federal agency, having jurisdiction over lands in Alaska, to evaluate the potential effects of proposed land-use activities on subsistence uses and needs. Section 810 of ANILCA states:

> In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the agency having primary disposition over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such federal agency:
>
> (1) gives notice to the appropriate state agency and appropriate local committees and regional councils established pursuant to ANILCA Section 805;
>
> (2) gives notice of, and holds, a hearing in the vicinity of the area involved; and
>
> (3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands; (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such action.

The Affected Environment section displays the historical, current and anticipated subsistence use trends by rural communities of the Tongass National Forest.

Evaluation of Effects on Subsistence Users and Needs

The intent of this evaluation is to find if implementation of any of the proposed Alternatives would lead to activities that "may" cause a significant possibility of a significant restriction of subsistence uses on the Tongass National Forest.

The Alaska Land Use Council's definition of "significantly restrict subsistence use' is one guideline used in the evaluation. By this definition:

> A proposed action shall be considered to significantly restrict subsistence uses, if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by: reductions in abundance of, or major redistribution of resources; substantial interference with access; or major

> increases in the use of those resources by non-rural residents. The responsible line officer must be sensitive to localized, individual restrictions created by any action and make a decision after reasonable analysis of the information available.

The U.S. District Court Decision of Record in Kunaknana v. Watt provided additional definitions of "significant restriction of subsistence uses" and are also used as a guideline in the evaluation and preliminary finding:

> Significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or slight effect as opposed to large or substantial effects. In further explanation the Director (BLM) states that no significant restriction results when there would be "no or slight" reduction in the abundance of harvestable resources and no occasional redistribution of these resources. There would be no effect (slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources (that is, no substantial increase in hunting by non-rural residents).
>
> Conversely, restrictions for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites or major increases in...non-rural resident hunting.
>
> In light of this definition the determination (finding) of significant restriction must be made on a reasonable basis, since it must be decided in light of the total subsistence lands and resources that are available to individuals in surrounding areas living a subsistence lifestyle.

The present section evaluates how the proposed management alternatives could affect subsistence resources used by the rural communities of Southeast Alaska. It is important to remember that, being programmatic, implementation of this Forest Plan does not authorize any activities to actually take place on the ground. The Forest Plan allocates or zones the Forest to different uses.

Site-specific project plans will be developed to determine such things as the exact location of timber harvest units. Site-specific subsistence analysis will be conducted in conjunction with each project-level plan authorizing on-the-ground activities.

Because the Forest Plan is programmatic and does not authorize any activities to actually take place on the ground, the effects presented assume that all permissible activities will take place when, in fact, they may not actually take place. That is, the effects presented are projected effects of implementation of the alternatives.

Effects of the proposed alternatives are evaluated by changes in abundance or distribution of each subsistence resource followed by a discussion of changes in access to subsistence resources and changes in competition from non-subsistence users for the subsistence resource categories.

The subsistence resources evaluated are: fish and invertebrates, black bear, brown bear, mountain goat, moose and deer. Deer account for a considerable amount of the edible pounds of subsistence resources harvested by Southeast Alaska communities. Proposed management activities are likely to have greater effects on deer than on other subsistence resources. Consequently, deer are analyzed by community, by WAA, later in this section.

At the end of the section that presents effects for each community, consideration is given to:

1. the availability of subsistence resources on adjacent lands,
2. alternative actions in a range of management emphases,
3. mitigative means of lessening impacts related to proposed actions,
4. the cumulative impacts of past, present and reasonably foreseeable future activities on subsistence users and resources,
5. potential cultural and social implications affecting subsistence users, and
6. the mapped subsistence use areas of the Tongass National Forest

Direct, Indirect and Cumulative Effects

Fish and Invertebrates

Salmon, other finfish and invertebrates comprise 61 percent of the total edible pounds of subsistence resources harvested by Southeast Alaska community residents (Kruse and Muth, 1990). Given the 100 foot no cut buffer areas along Class I streams and Class II streams flowing directly into Class I streams, and application of Best Management Practices on all other streams, no significant decline in salmon, other finfish or invertebrate habitat capability is expected from implementation of any alternative. However, some areas may have reductions in fish habitat capability as a result of past management practices. The greatest reduction is anticipated (without restoration) to be approximately 15 percent for coho salmon on a portion of Prince of Wales Island in the year 2075. Habitat restoration has been implemented in many areas having reduced habitat capability. All of the alternatives will provide for habitat improvement projects which will lead to increases in future fish production (See the Fish section of this chapter and the Implementation Schedule of Fish Improvement Projects in the Proposed Forest Plan).

Likewise, no significant decline in habitat capability for waterfowl, seabirds, edible plants or firewood is expected from implementation of any alternative. Waterfowl, seabirds and edible plants account for only four percent of the total edible pounds of subsistence resources harvested by Southeast Alaska residents (Kruse and Muth, 1990).

Land mammals other than deer account for only four percent of the total harvest of edible subsistence resources (Kruse and Muth, 1990). This includes black bear, brown bear, moose, mountain goats and furbearers.

When collecting information about the number of bear, moose, mountain goats and furbearers harvested, the Alaska Department of Fish and Game makes no distinction between subsistence and non-subsistence users. Consequently, a determination of the number of bear, moose, mountain goats and furbearers needed for subsistence purposes versus sport purposes cannot be made. The following analyses were conducted for the combined predicted future need of these resources by both subsistence and non-subsistence users.

Black bear

The predicted future need for black bear was calculated by averaging annual harvest over the last 10 years and projecting human populations. Statistical analysis shows that the variation becomes so large that predicting demand, based on population, with any degree of confidence beyond 10 years, is not possible. Consequently, predicted subsistence and non-subsistence demand for black bear increased from 587 at present to 743 by the second decade where it was held constant.

Appendix L displays the habitat capability for black bear for each alternative for the next 150 years. Forest-wide, the habitat capability for black bear exceeds 11,000 bears in each alternative for the next 150 years. At a seven percent harvest rate of habitat capability, there is adequate capability to provide for predicted subsistence and non-subsistence needs for black bear for the next 150 years. Consequently, no significant decline in habitat capability or in subsistence availability for black bear is expected from implementation of any alternative. However, some displacement of hunters to other WAA's could occur to manage black bear populations.

Black bear harvest rates in 1989 measurably exceeded a seven percent habitat capability harvest rate in the following WAA's: 1214, 1315, 1317, 1318, 1422, 1527, 1530, 2007, 2304, 5132, 5012, 5013, 5016 and 5018. See the Wildlife section for a more detailed discussion of likely effects of alternatives on black bear.

Brown bear

The predicted future need for brown bear is 202 bear for subsistence and non-subsistence hunters. Predicted future need for brown bear was calculated by averaging annual harvest over the last 10 years and projecting human populations. Statistical analysis shows that the variation becomes so large that predicting demand, based on population, with any degree of confidence beyond 10 years, is not possible. Consequently, predicted subsistence and non-subsistence demand for brown bear is held constant at 202 bear.

Appendix L displays the habitat capability for brown bear for each alternative for the next 150 years. Forest-wide, the habitat capability for brown bear exceeds 6,100 bear in each alternative for the next 150 years. This is a greatly reduced estimate from what was displayed in the 1990 DEIS. The interagency task force, after reviewing model outputs, determined that the habitat capability model was overestimating brown bear populations by 70 percent on the mainland. Density estimates were reduced accordingly.

Under a maximum potential effects scenario, brown bear habitat capability is predicted to be 5,576 after 150 years. At an annual harvest rate of four percent harvest of habitat capability, 223 bears could be harvested. Predicted demand is 202.

Brown bear harvest rates in 1989 exceeded four percent in the following WAA's: 3938, 3939, 3940, 4503 and 4508. The total demand for brown bear likely cannot be met in some WAA's where successful hunting currently occurs. Displacement of hunters to other areas and/or hunting restrictions may be necessary to manage brown bear populations. See the Wildlife Consequences section for more detail.

Mountain goat

In the decade between 1980 and 1990, mountain goat hunting ranged from a low of 140 to a high of 239 and averaged 190 goats. There is no clear basis for a future demand projection, therefore, the predicted future need for goats is 190.

Under a maximum potential effects scenario, mountain goat habitat capability after 150 years is about 8,450. At a seven percent harvest rate of habitat capability, up to 590 goats could be harvested. In the 1980's, WAA's 3001 and 3003 had hunter harvest above seven percent of current habitat capability. Otherwise harvest was generally within seven percent for each WAA.

The predicted subsistence and nonsubsistence needs for goats (190) accounts for only two percent of the habitat capability. It is important to note that mountain goats are susceptable to disease and predation and these factors must be considered when determining healthy goat

populations. Because predicted need for goat can be met, no significant decline in habitat capability or in subsistence availability for mountain goat is expected from implementation of any alternative for the next 150 years.

Moose

The current estimated population of moose on the Tongass is about 1,900 animals. Moose hunting is by permit system only which serves to tightly control moose harvest within ADF&G Game Management Units.

Because of the tightly controlled harvest, a demand estimate was not made. ADF&G's strategic moose plan documents 177 moose harvested in 1989 with an objective to increase the harvest to 231 per year by 1994. ADF&G has set a harvest rate objective of between eight and nine percent of the estimated number of animals and assumes this will meet demand.

No cumulative adverse effects on subsistence are anticipated under any alternative for moose habitat capability. Timber harvest can provide short-term forage increases which can be beneficial to moose populations. See the Wildlife Consequences section for further discussion regarding potential habitat improvement.

Furbearers

The predicted future need for furbearers, specifically marten, is based on the average of 1984 through 1987 trapping statistics. It is predicted that 2,772 marten will be needed to meet subsistence and non-subsistence needs. Statistical analysis shows that the variation is so large that predicting demand, based on population, with any degree of confidence beyond 10 years, is not possible. Consequently, predicted subsistence and non-subsistence demand for marten is held constant at 2,772 marten.

Appendix L displays the habitat capability for marten for each alternative for the next 150 years. Forest-wide, the habitat capability for marten exceeds 2,772 marten in each alternative for the next 150 years at a 40 percent harvest level. However, expected demand in WAA's 1211, 1317, 1318, 1420, 1522,1525, 3523, 3524, 3627 cannot be met by Alternatives A, B or D in the fifteenth decade. In addition to these WAA's, expected demand cannot be met for WAA's 613 or 2202 in the fifteenth decade by Alternatives C or P. See the Wildlife Consequences section for more detail.

Access

Historical access to subsistence hunting and fishing areas on the Tongass will not be impacted by any of the proposed Revision alternatives. Historical access has been by foot, boat and floatplane and is available in all the alternatives for present and proposed foreseeable future activities. This results from none of the alternatives limiting use on public lands for the purposes of subsistence gathering activities (Section 811 (a-b) ANILCA).

Roads constructed on the Tongass primarily for timber harvest activities and to a lesser scale for mineral and recreational activities, have changed the use patterns for subsistence, by providing new access to portions of the Forest not previously utilized. Road construction radiating from established communities allows residents to choose between traditional access means or other means. Information regarding the degree to which specific WAA's may be roaded in each alternative in presented by community in Appendix K.

All communities having new road access to previously underutilized subsistence areas have capitalized on the opportunity to expand their range provided by the road systems (Bosworth, 1989; Ellanna and Sherrod, 1987; and Mills and Firman, 1986). As a result of the new road

construction, new use patterns are displayed around each of the communities (USFS, Tongass Resource Use Cooperative Survey Draft Maps, 1988). Often, only the corridor of the road is used (Subsistence Map).

Considering only the access provided by new road construction, some rural communities in Southeast Alaska have stated that they favor the new access for subsistence gathering (USFS, Alaska Pulp Corporation Final Supplement to the EIS for the 1981-86 and 1986-90 Operating Periods, Subsistence Hearings Record and 1989-94 Operating Period for the KPC Long-term Sale Area FEIS, Subsistence Section). Roads provide safe access to wildlife and fish habitat that would not have been possible when inclement weather nullified boat travel, cost of air travel was excessive, or distances to potential sites was too great to make the trip by foot.

Alternative D, provides the most access to new subsistence use areas, while Alternative A provides the least amount in the form of new road construction. Alternatives B, C and P range between Alternatives A and D.

Based on data available for analysis, development activities are not likely to lead to a significant possibility of a significant restriction of subsistence access to the resources.

Competition

Competition for subsistence resources, primarily deer, is a result of factors such as fish and game regulations, mobility, the natural distribution of game species across the Tongass, decreases in resource populations as a result of habitat reductions, decreases in resource populations as a result of overharvest, and access provided to all rural communities in the form of roads, Alaska Marine Highway System and commercial air carriers. As a result of these factors and the majority of the population (Juneau and Ketchikan residents) residing in non-rural designated communities, competition for the more abundant wildlife and fisheries resources around rural communities results (ADF&G, Division of Wildlife Conservation, Deer, 1 July 1987-30 June, 1988).

Competition for wildlife and fisheries resources on Chichagof and Prince of Wales Islands has resulted from increased road systems, community access via roads and ferry system routes, and the fact that non-rural residents do not live in locations where abundant wildlife resources exist. Non-rural residents have sought out the resources provided on these islands for sport use. The largest numbers of hunters on both islands by any one community is attributed directly to the use by Juneau and Ketchikan residents (ADF&G, Division of Wildlife Conservation, Deer, 1 July 1987-30 June, 1988). These two communities being non-rural, thus not qualifying for subsistence privileges, compete for the resources also sought by rural residents of the other 31 communities in Southeast plus rural residents of logging and mining camps.

Rural residents living in the many communities of Prince of Wales and Chichagof Islands find that they, too, have the opportunity to hunt in non-traditional areas that were previously underutilized. Competition between rural communities has resulted from the interconnected road systems of these two Southeast Alaska Islands (USFS, Alaska Pulp Corporation Long-Term Timber Sale Contract, Final Supplement to the Environmental Impact Statements for the 1981-86 and 1986-90 Operating Periods, 11/89).

Issues have also been raised about competition for subsistence resources in the community of Yakutat, Alaska. Although no interconnecting road system between communities exists and no ferry connection is available via the Alaska Marine Highway System, competition for the fish and wildlife resources has occurred as a result of an influx of non-resident and non-rural residents. Yakutat supports one of the most abundant upland salmon harvest systems in the Southeast Alaska (See the Fish section in this chapter). Big game species of brown bear and

moose exist on the Yakutat Forelands and are easily accessed (Chapter 3, Wildlife). Commercial air service is available to Yakutat from anywhere in the world, and commercial air service out of Yakutat to the Forelands provides access to the resource populations found there. As a result of this easy access and abundant resources in both fish and wildlife species, competition is an existing factor in the management of fish and game.

Competition for the subsistence resources is also a result of abundance. In areas of the Tongass where over-harvest of the resource has occurred, or where reduction of habitat or natural reduction in the populations has occurred, demand for the fish and wildlife resources has been shown to move from historical harvest areas to new areas. An example of this move has been shown on Kuiu and Mitkof Islands, which at one time supported large deer populations that have been reduced by predation and overwinter kills (USFS, Analysis of the Management Situation, 1/90, Wildlife). Residents of communities such as Port Alexander, Kake, Petersburg, Wrangell, Point Baker, Cape Pole and others have shown historical use of both Kuiu and Mitkof Islands (Subsistence Map). Due to decreases in populations of deer on both these islands, harvest use areas have moved to new areas where the resources presently exist. Increased pressure and competition for the resources has occurred as a result of this move on Admiralty, Baranof and Chichagof Islands.

Assumptions made for analyzing the differences between alternatives due to competition for subsistence resources include:

1. New road construction adjacent to communities with ferry access will result in increased competition from outside communities.
2. New road construction adjacent to existing road systems where interties between communities exists, will result in increased competition from surrounding communities associated with the inter-connected roads.
3. Habitat reductions for subsistence resources has the potential of producing fewer animals. If regulations allow use to remain constant then increased competition will result from the same number of users seeking fewer huntable resources.
4. The demand for resources will remain constant or increase slightly as the habitat capability remains the same or declines over time.

Given the above assumptions, Alternative A would provide the least amount of competition for subsistence resources from non-rural residents. Alternative D would provide the most competition as a result of increased road construction, decreases in habitat, decreases in harvestable populations and increases in non-rural residences. Alternatives B, P and C, respectively, fall within the range set by Alternatives A and D.

At some point in time, further regulation of non-rural harvest of game and fish populations for resources on Chichagof and Prince of Wales Islands may have to be implemented. Also, there may be the need to prioritize the harvest of game and fish resources among rural communities whose residents are harvesting resources outside their typical home-range areas. This in essence would place non-rural use of the resources back to pre-roaded use allotments. This type of action, as prescribed by ANILCA Section 804, may be necessary to ensure the availability of adequate abundance of resources needed by rural communities using the Tongass National Forest in the future.

Based on data available for analysis, development activities allowed by the alternatives considered in this Forest Plan, could lead to a significant possibility of a significant restriction of subsistence use. This potential restriction is a result of competition for the resources by non-rural as well as rural residents of Chichagof, Baranof and Prince of Wales Islands.

Deer comprise 21 percent of the total edible pounds of subsistence resources harvested by Southeast Alaska residents (Kruse and Muth, 1990). Because deer are an important subsistence species and because Forest Service activities can effect deer habitat capability, analysis in the following section emphasizes the likely effects of alternatives on deer habitat capability in each Wildlife Analysis Area (WAA) harvested by each Southeast Alaska community.

Community Background

Settlements in Southeast Alaska range in size from one person living in a sheltered bay to more than 26,000 people living in a full-service community. Although some communities are on Forest road systems, most settlements are accessed primarily, if not exclusively, by aircraft or boat. This relative degree of remoteness, combined with the considerable scenic and recreation opportunities provided by the Tongass National Forest, is sought by many wanting a more self-reliant lifestyle. Residents are often quick to point out the quality of life found in Southeast Alaska outweighs the possible disadvantages of seasonal employment, lack of jobs, cost of importing goods and services, transportation, and weather.

Southeast Alaska communities exhibit varying degrees of economic development and diversity; while fishing, timber, tourism, mining and government are the major economic sectors, the importance of these activities is characterized by considerable local variability. Some communities have little or no local economy in the conventional sense and rely heavily on subsistence use of local fish and game resources.

This section outlines, by community, the history, economy, opinions, and subsistence and recreation use patterns of Southeast Alaska community residents. Community characteristics are followed by an explanation of the direct, indirect and cumulative effects of each alternative. Communities listed are those included in the Tongass Resource Cooperative Survey (TRUCS) of 1987 with the addition of Juneau, and Ketchikan. The communities discussed are listed in alphabetical order.

Methodology and Scientific Accuracy

Community information comes from three sources: 1) *Southeast Alaska Rural Community Resource Use Profiles*, A Report to the Board of Fisheries, February 1989. Alaska Department of Fish & Game Division of Subsistence Technical Paper Series; 2) *Demographic Background Material for 30 Southeast Alaska Communities* by Robert F. Schroeder, Ph.D. Report to the Alaska Board of Fisheries Meeting, Juneau, Alaska, February and March, 1989. Division of Subsistence Alaska Department of Fish and Game. February, 1989; 3) *Community Reports Tongass Resource Use Cooperative Survey*. September 1988. Institute of Social and Economic Research, University of Alaska Anchorage in cooperation with U.S. Forest Service, Division of Subsistence, Alaska Department of Fish and Game.

Information about recreation and subsistence use patterns comes primarily from four sources: 1) Recreation Place Inventory, Revision data base 1991. 2) "Community Reports Tongass Resource Use Cooperative Survey;" 3) "Deer Hunter Survey Statistics," 1987, 1988, 1989. Alaska Department of Fish and Game; 4) Subsistence Map, Revision data base, 1991.

Information from the Tongass Resource Use Cooperative Survey (TRUCS) is considered a "snapshot" in time, reflecting subsistence use statistics for only a brief period during which subsistence harvest of the resources has occurred.

Many Southeast Alaska community residents have varying and divergent opinions on how the Forest should be managed. Rarely, if ever, is community consensus on even one issue achieved. This is a direct reflection of conflicting values held by the resident population. A

number of individuals from Southeast communities provided written comments about the planning issues for the Forest Plan Revision and offered oral and written testimony on the 1990 Draft Environmental Impact Statement (DEIS). Those who commented were part of a sparse, non-random, self-selecting sample. Their comments should not be considered a reflection of community opinion. See Appendix A for details regarding issues and summaries of comments on the DEIS.

To determine the amount of an area that is roaded, a 600-foot buffer was placed on each side of existing roads. The associated acreage is reported as a percent of the Wildlife Analysis Area used by subsistence households for deer hunting.

Regarding the predicted future need for deer, the actual number of deer harvested by each community (subsistence and non-subsistence) in 1989 was used. This is the most recent year for which information regarding deer harvest is available. While the number of deer harvested was highest in 1987, these numbers declined more than 20 percent by 1989. In addition, the number of hunters declined from nearly 14,000 in 1986 to just over 12,000 in 1989 despite a stable human population. In many smaller Southeast communities, human population has actually declined. Because no clear trend exists, the predicted future needs for deer were assumed to be constant over the next 50 years.

See the demand section of the Wildlife chapter for an explanation of the rationale for using a 10 percent habitat capability harvest rate.

The following community discussions summarize the detailed subsistence deer harvest information presented in Appendix K. Refer to this Appendix for specifics regarding areas used by community residents for subsistence.

Angoon

Angoon, located on the west coast of Admiralty Island at the mouth of Kootznahoo Inlet began as a winter village for the Tlingit Indians. Industry first developed with establishment of a whaling station at nearby Killisnoo, but the whaling industry did not last long. The company then switched to herring processing, but eventually went bankrupt in 1885. Another processing plant followed and prospered, until it was closed in 1930.

The only community on Admiralty Island, Angoon, has a population of 528. Angoon remains a traditional Tlingit Indian Village with 78 percent of the population being Alaska Native. Traditional Tlingit customs are more prevalent here than in other Southeast communities. Commercial fishing is a major source of income for Angoon, and many residents are commercial hand trollers. Due to competition from larger fishing boats, a shortened season, and closure of some areas, fishing does not provide a strong economic base for the community.

Economy

The major sectors of Angoon's economy are educational services, fisheries, construction, and retail trade. Employment in all sectors of Angoon's economy is highly seasonal. Unemployment in Angoon is high throughout the year. Problems associated with high unemployment are compounded by the high cost of living. Subsistence hunting and fishing are a vital source of food in Angoon as well as being an important part of the lifestyle and culture. Average per capita yearly income for Angoon is $6,000 (TRUCS, 2/89).

Opinions

A number of Angoon residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Certain Angoon residents expressed a desire to see more emphasis placed on scenic resources, recreation, fish, wildlife, and subsistence. These same residents also indicated they want the current timber sale program reduced. They do not want additional roads, log transfer facilities nor do they want to be connected to other existing roads. They emphasized the importance of subsistence to the community and pointed out the detrimental changes to their traditions since Caucasians came to the area 250 years ago.

Subsistence and Recreation Use

Based on edible pounds harvested, deer at 30 percent and salmon at 29 percent are the most important subsistence resources for Angoon households (Kruse and Frazier, 1988). Angoon hunters travel an average of 13 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include roads, or clearcuts of any age and are more likely to hunt in areas that include grassy meadows, old-growth forest, muskeg, open beaches, or areas above tree line (Kruse and Frazier, 1988).

Appendix K provides detailed information regarding the areas that Angoon households have ever used to hunt deer. Summarizing, the majority of Angoon households hunt deer in Wildlife Analysis Areas (WAA's) 4042, 4043, and 4054. These WAA's are roadless. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 4042 (69 deer), 3315 (49 deer) and 3308 (49 deer) (ADF&G, 1989). These WAA's are 0, 11 and 36 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

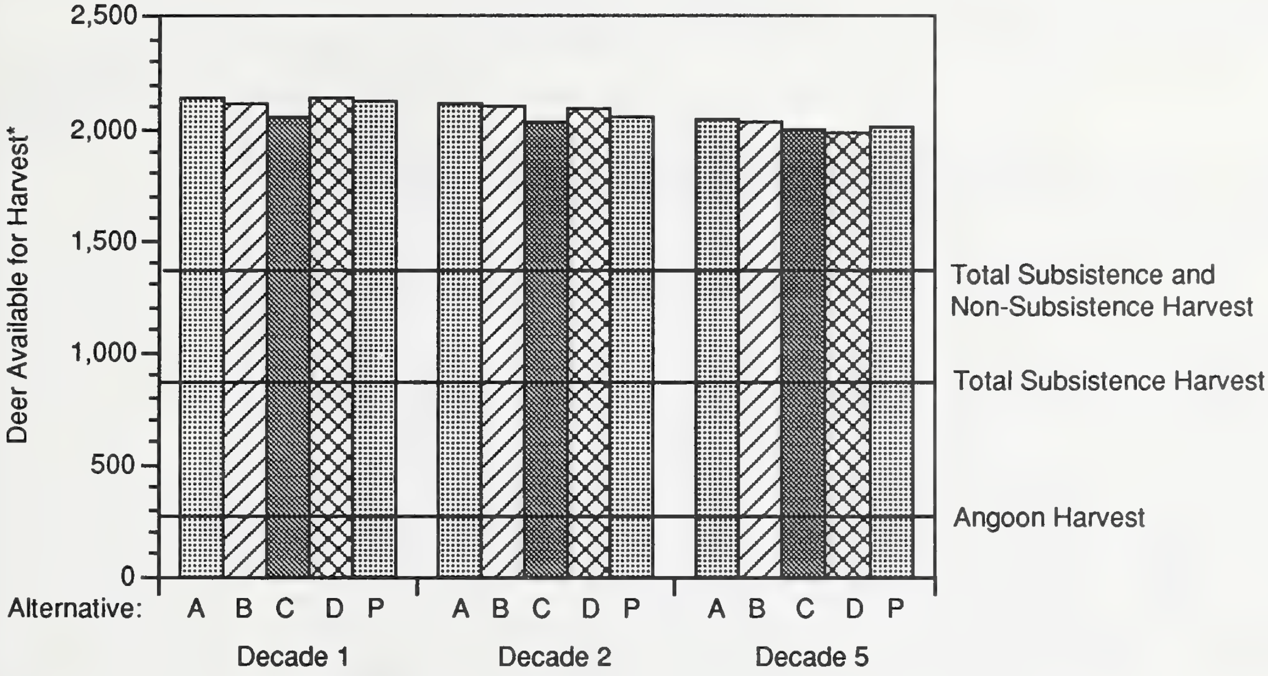
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 52 percent of the total edible pounds of subsistence resources harvested by Angoon households (Kruse and Frazier, 1988).

Figure 3-69 displays the abundance, distribution and competition for deer in all the WAA's where Angoon hunters actually harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 30 percent of the total edible pounds of subsistence resources harvested by Angoon households (Kruse and Frazier, 1988).

WAA's where the majority of Angoon households hunt deer (4042, 4043, 4054) are designated Wilderness in all alternatives consequently, they will never be roaded. With exception of WAA 4042, WAA's where Angoon hunters most successfully harvested deer (3313, 3308, 4042) are allocated to land use designations that allow timber harvesting in all alternatives.

Figure 3-69

Deer Availability and Anticipated Harvest in Areas Used by Angoon Households *



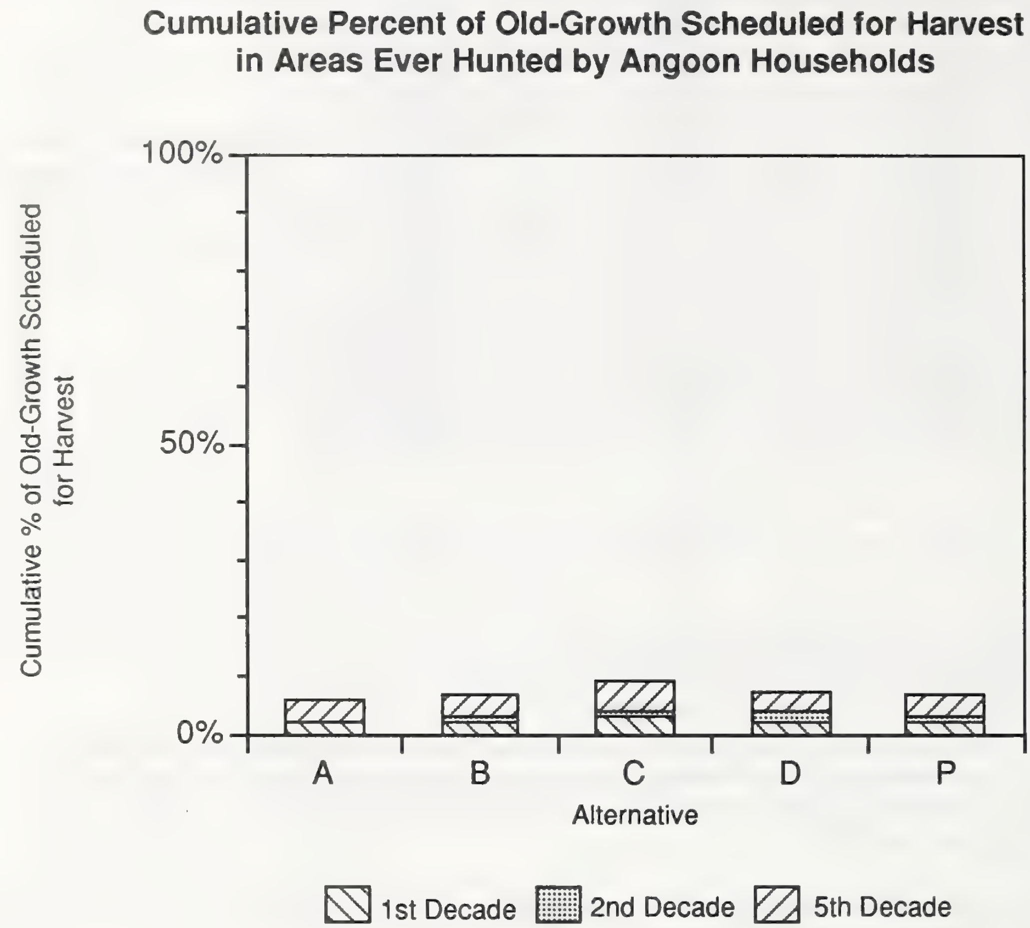
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (11 WAA's). Analysis does not include those WAA's (32 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-70 shows that no more than nine percent of the existing old-growth in WAA's ever hunted by Angoon households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Angoon are allocated to Wilderness land use designations in all alternatives.

Figure 3-70



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Coffman Cove

Coffman Cove is located on northeast Prince of Wales Island. The population of 224 includes no Alaska Natives. The settlement of Coffman Cove occurred in 1956 with development of a logging camp. Many of the logging camp residents reportedly moved to the Cove from other camps on Prince of Wales Island.

Economy

Major sectors of the Cove's economy are logging, retail trade, fishing, and education services. Employment is highly seasonal. Coffman Cove's average per capita income is $32,917 (TRUCS, 2/89).

Opinions

A number of Coffman Cove residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Coffman Cove residents who commented on the issues indicated that the Forest should be managed both for scenic quality and timber harvesting. Community opinion was split on the topic of recreation with about half wanting more emphasis placed on recreation and half being satisfied with the current management emphasis. Regarding fish, wildlife, and subsistence, Coffman Cove residents who responded indicated that current management emphasis was adequate. These individuals want the current level of timber harvest to continue and favor additional roads, transfer facilities and connecting existing roads. They do not want roads to be closed because they are important to access subsistence resources and recreation areas. Residents are split in their opinion about mineral exploration and development with some wanting more emphasis, others less, and still others wanting a mix of emphasis. Those who responded indicated that a combination of timber, mining, and other commodity industries with tourism, recreation and fishing would be the most desirable use of Forest resources.

Subsistence and Recreation Use

Based on edible pounds harvested, deer at 32 percent, finfish other than salmon at 31 percent and salmon at 29 percent are the most important subsistence resources for Coffman Cove households (Kruse and Frazier, 1988). Coffman Cove hunters travel an average of 10 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include open beach, older clearcuts, or grassy meadows and more likely to hunt in areas that include muskeg, old-growth forest, roads, young or middle-aged clearcuts, or areas above tree line (Kruse and Frazier, 1988).

Appendix K provides detailed information regarding the areas that Coffman Cove households have ever used to hunt deer. Summarizing, the majority of Coffman Cove households hunt deer in Wildlife Analysis Areas (WAA's) 1420, 1421, and 1422. These WAA's are 53, 44 and 58 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 1421 (48 deer), 1530 (33 deer) and 1420 (27 deer) (ADF&G, 1989). These WAA's are 44, 55 and 53 percent accessible via existing roads (Appendix K).

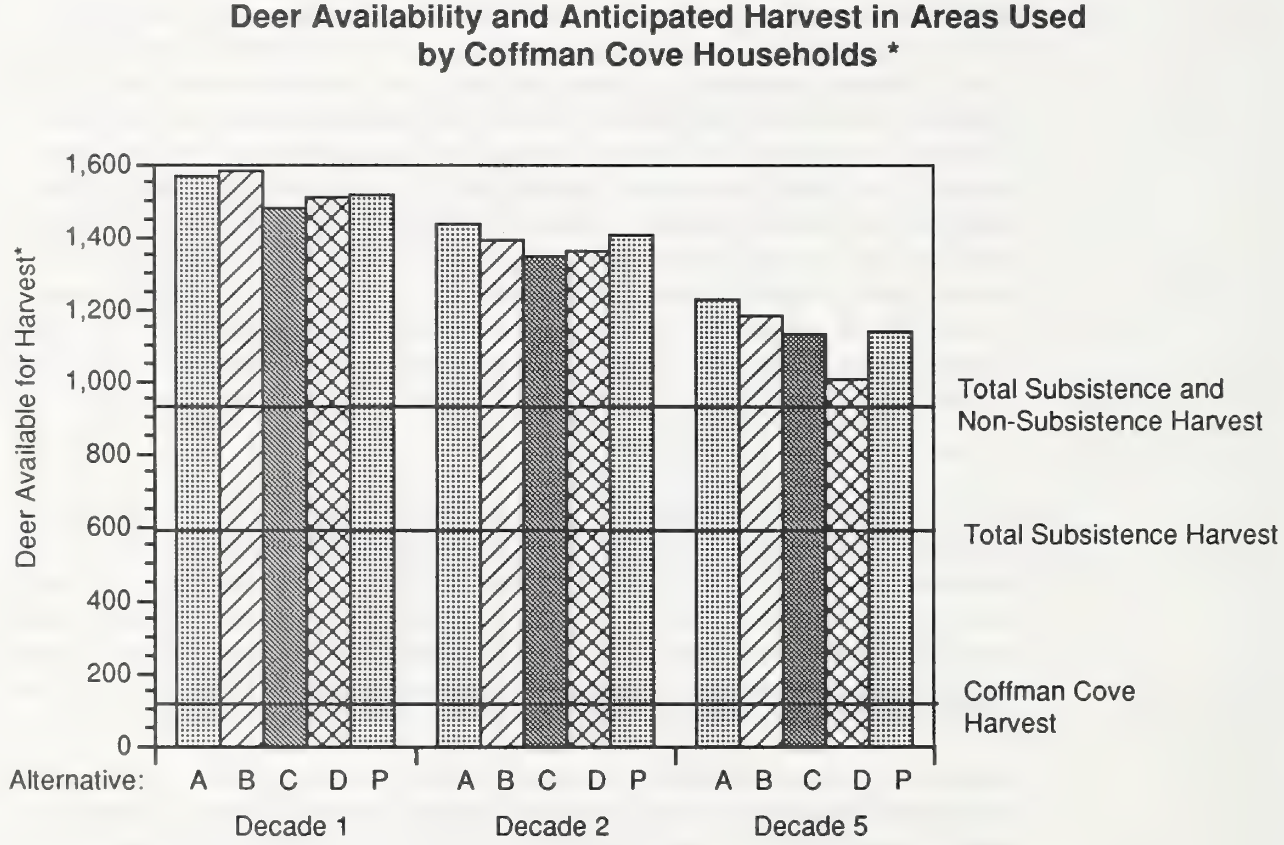
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 65 percent of the total edible pounds of subsistence resources harvested by Coffman Cove households (Kruse and Frazier, 1988).

Figure 3-71 displays the abundance, distribution and competition for deer in all the WAA's where Coffman Cove hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 32 percent of the total edible pounds of subsistence resources harvested by Coffman Cove households (Kruse and Frazier, 1988).

WAA's where the majority of Coffman Cove households hunt deer (1420, 1421, 1422) and are successful (1420, 1421, 1530) are allocated primarily to land use designations that allow timber harvesting in all alternatives.

Figure 3-71



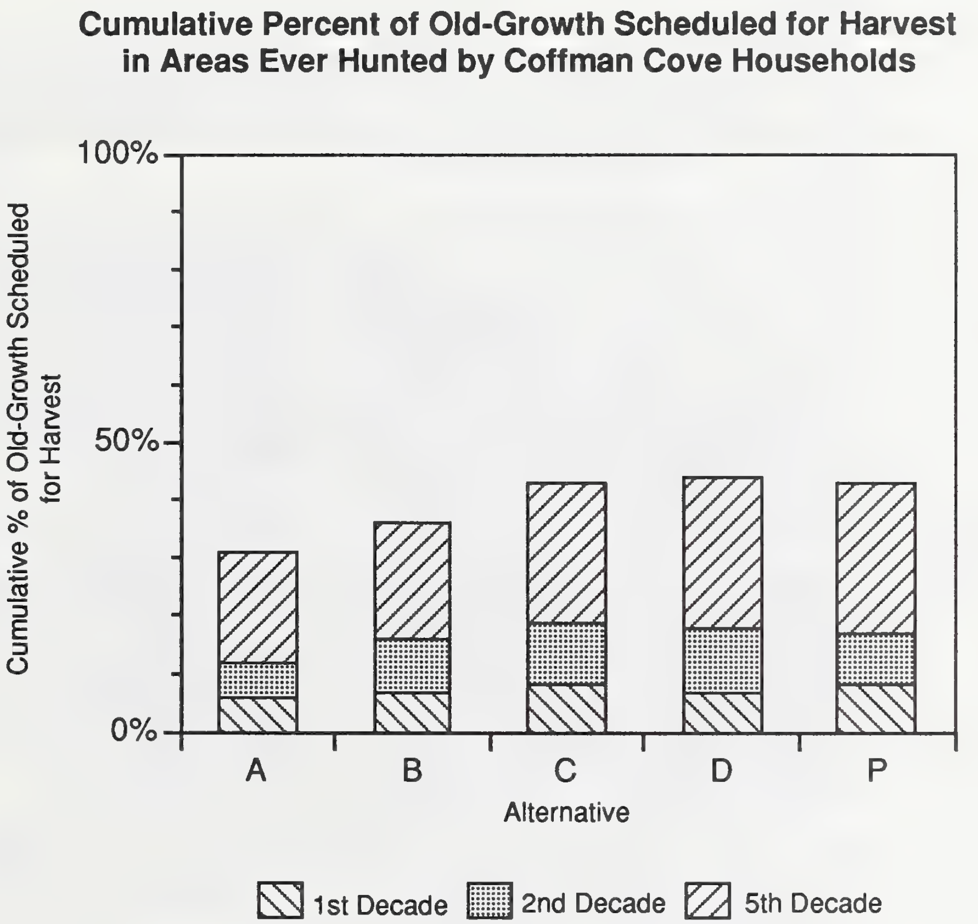
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (6 WAA's). Analysis does not include those WAA's (30 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-72 shows the percent of existing old-growth in WAA's ever hunted by Coffman Cove households that would be harvested in any alternative for the next 50 years. Between six percent (Alternative A, first decade) and 45 percent (Alternative D, fifth decade) of the old-growth would be harvested.

The majority of recreation places near Coffman Cove are existing Wilderness or allocated to natural setting land use designations in Alternatives A, B and D; and, to designations that allow timber harvesting in Alternatives C and P.

Figure 3-72



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Craig

Located on a tiny island connected to Prince of Wales Island by a causeway, Craig's population is 1,182. First used by Tlingit Indians for fishing camps and seasonal villages, the community developed with the commercial fishing industry. A saltery was built in 1907; a cold storage plant in 1908. Craig expanded and declined with fluctuations in the fishing industry. In recent years, the population has been rising due to improved transportation, revitalization of the cold storage plant, timber harvesting, and expanded moorage facilities. Alaska Natives account for 28 percent of the population.

Economy

The major sectors of Craig's economy are retail trade, fishing, and timber products. Employment is seasonal in fishing, timber, retail, and construction sectors. Craig's average per capita income is $12,000 (TRUCS, 2/89).

Opinions

A number of Craig residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Craig residents who responded to the issues want to be able to harvest timber along the Alaska Marine Highway routes, roads, and streams and around their community. However, they also requested that additional emphasis be placed on recreation, fish, and old-growth habitat near their community. Opinions were divided on the emphasis to be placed on subsistence; half wanted more, half wanted less. Respondents requested the current timber sale program be reduced. They favor the current emphasis on mineral exploration and development. Residents who responded to the issues requested that management emphasize tourism, wildlife, recreation, and subsistence sectors of the economy.

Subsistence and Recreation Use

Based on edible pounds harvested, invertebrates at 26 percent and deer, salmon, and finfish other than salmon at 22 percent each are the most important subsistence resources for Craig households (Kruse and Frazier, 1988). Craig hunters travel an average of 25 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include older or middle-aged clearcuts, or open beach and more likely to hunt in areas that include muskeg, old-growth forest, roads, grassy meadows, areas above tree line or young clearcuts (Kruse and Frazier, 1988).

Appendix K provides detailed information regarding the areas that Craig households have ever used to hunt. Summarizing, the majority of Craig households hunt deer in Wildlife Analysis Areas (WAA's) 1420, 1421, and 1422. These WAA's are 53, 44 and 58 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 1318 (168 deer), and 1422 (134 deer) (ADF&G, 1989). These WAA's are 15 and 58 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

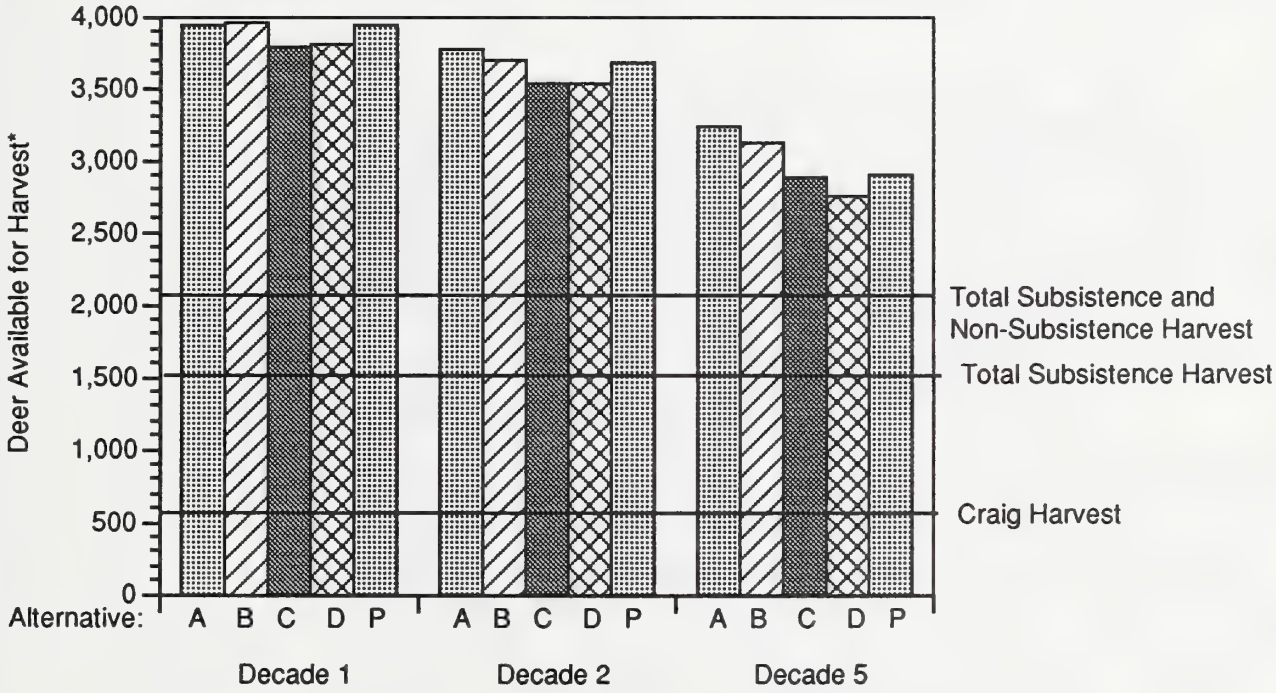
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 70 percent of the total edible pounds of subsistence resources harvested by Craig households.

Figure 3-73 displays the abundance, distribution and competition for deer only for the WAA's where Craig hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 22 percent of the total edible pounds of subsistence resources harvested by Craig households (Kruse and Frazier, 1988).

WAA's where the majority of Craig households hunt deer (1420, 1421, 1422) and are successful (1318) are allocated primarily to land use designations that allow timber harvesting in all alternatives.

Figure 3-73

Deer Availability and Anticipated Harvest in Areas Used by Craig Households *



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

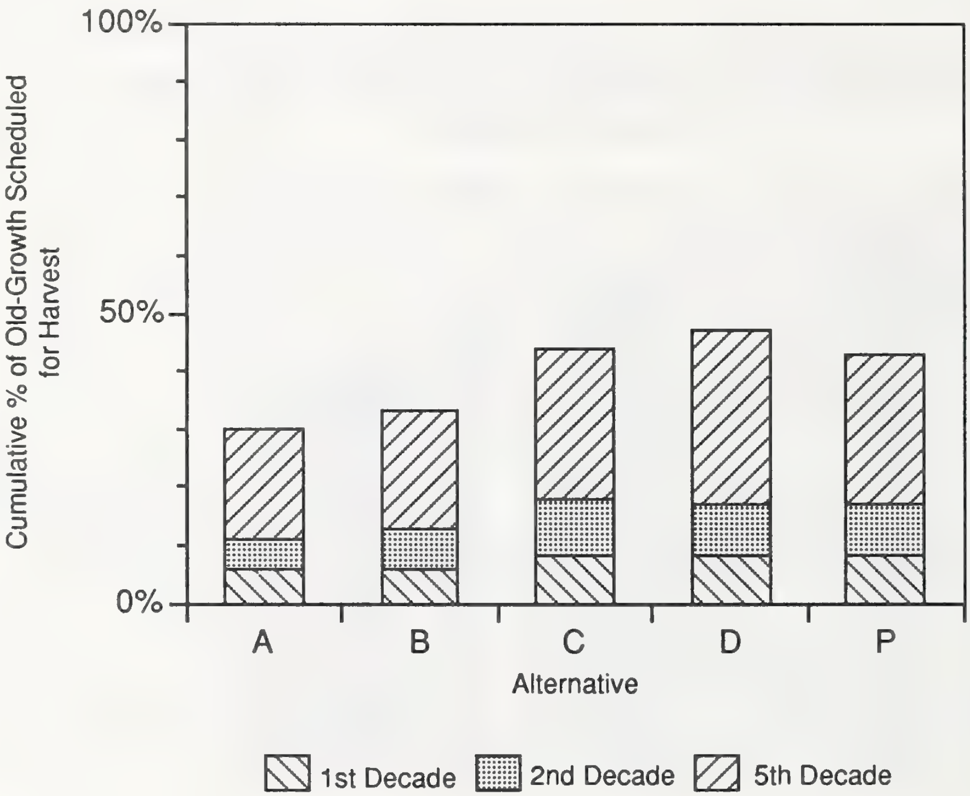
*This analysis was conducted only for those WAA's from which community residents actually harvested deer (16 WAA's). Analysis does not include those WAA's (32 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-74 shows that between six percent (Alternative A, first decade) and 47 percent (Alternative D, fifth decade) of the existing old-growth in WAA's ever hunted by Craig households will be harvested within the next 50 years.

The majority of recreation places near Craig are allocated to land use designations that do not allow timber harvesting in Alternatives A and B and to designations that do allow timber harvesting in Alternatives C, D and P.

Figure 3-74

Cumulative Percent of Old-Growth Scheduled for Harvest in Areas Ever Hunted by Craig Households



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Edna Bay

Edna Bay is located on southeast Kosciusco Island, west of Prince of Wales Island, north of Sea Otter Sound. Its population is 69. Edna Bay has no Alaska Native population. Originally, Tlingit Indians from West Prince of Wales Island used Edna Bay on a seasonal basis. In 1943, a logging camp was established when the demand for aircraft-quality spruce was high. Logging facilities included housing, a few roads and a log transport site. When the last workers left the camp, all buildings were burned. In 1977, the State selected part of the Tongass National Forest at Edna Bay, with the U.S. Forest Service reserving two administrative sites. In 1982, the State sold several lots around the Bay to private landowners; since then, many permanent homes have been built.

Economy

Sectors of Edna Bay's economy include, fisheries, education services, construction, business and repair services. Employment in all these sectors is highly seasonal. The average per capita income for Edna Bay is $3,000 - the lowest reported per capita income in Southeast Alaska (TRUCS, 2/89).

Opinions

A number of Edna Bay residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Edna Bay residents who responded to the issues requested that additional emphasis be placed on scenic resources, fish, old-growth habitat around their community, and subsistence. Community opinion was split on recreation with half wanting more emphasis and half satisfied with the current recreation emphasis. Similarly, half of the residents were satisfied with the current emphasis on timber harvesting while half wanted less emphasis. Respondents do not want additional roads, log transfer facilities, or connections to other existing roads. They are opposed to emphasizing access for mineral exploration and development. They want management to emphasize tourism, wildlife, recreation and subsistence economic sectors.

Subsistence and Recreation Use

Based on edible pounds harvested, finfish other than salmon at 26 percent and deer and salmon at 21 and 20 percent, respectively, are the most important subsistence resources for Edna Bay households (Kruse and Frazier, 1988). Edna Bay hunters travel an average of eight miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include clearcuts of any age, areas above tree line, open beaches, or roads and more likely to hunt in areas that include old-growth forest, grassy meadow, or muskeg (Kruse and Frazier, 1988).

Appendix K provides detailed information regarding the areas that Edna Bay households have ever used to hunt deer. Summarizing, the majority of Edna Bay households hunt deer in Wildlife Analysis Areas (WAA's) 1525, 1526, and 1531. These WAA's are 86, 9 and 90 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 1531 (14 deer) and 1525 (11 deer) (ADF&G, 1989). These WAA's are 90 and 86 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

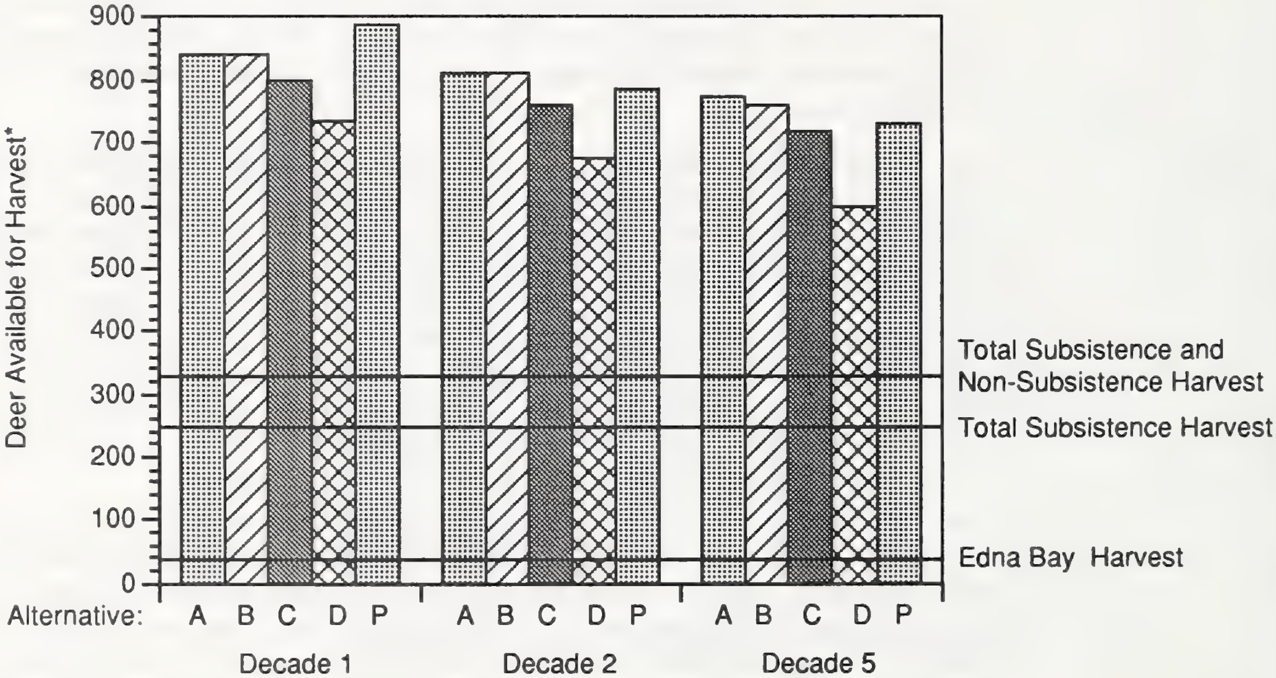
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 59 percent of the total edible pounds of subsistence resources harvested by Edna Bay households.

Figure 3-75 displays the abundance, distribution and competition for deer in all the WAA's where Edna Bay hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 21 percent of the total edible pounds of subsistence resources harvested by Edna Bay households (Kruse and Frazier, 1988).

With exception of WAA 1526, WAA's where the majority of Edna Bay households hunt deer (1525, 1526, 1531) and are successful (1525, 1531) are allocated primarily to land use designations that allow timber harvesting in all alternatives.

Figure 3-75

Deer Availability and Anticipated Harvest in Areas Used by Edna Bay Households *



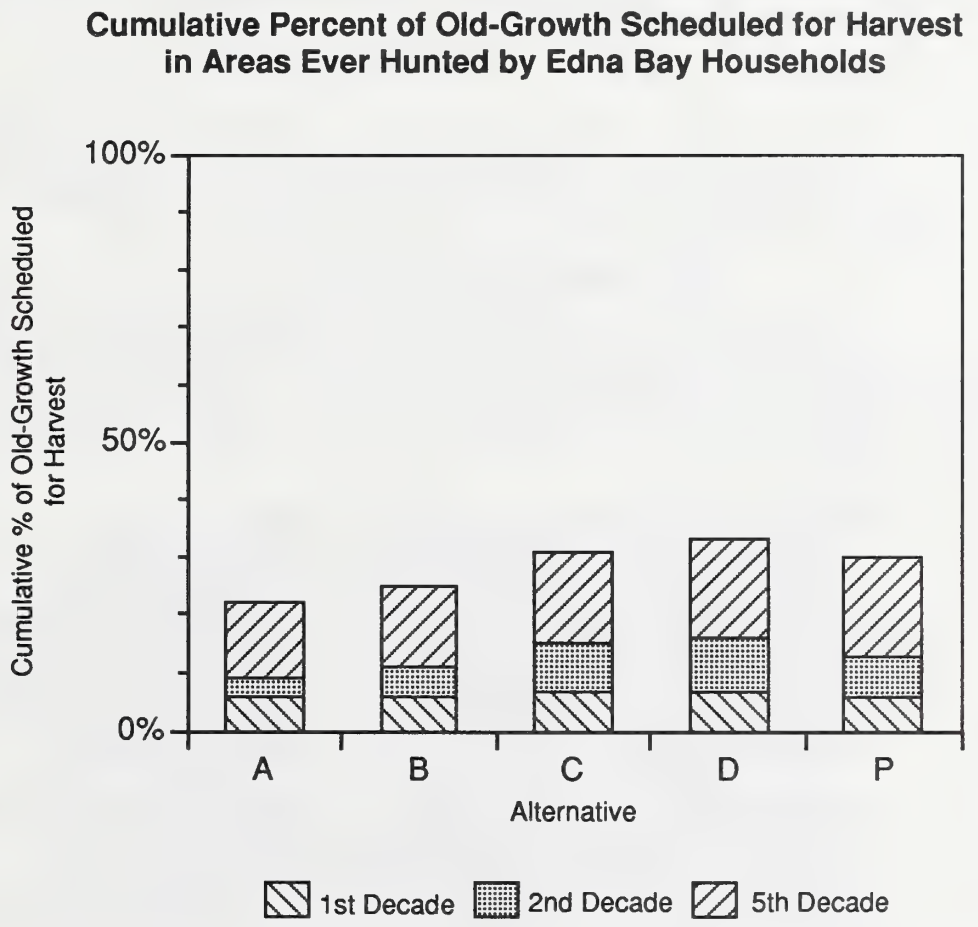
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (4 WAA's). Analysis does not include those WAA's (39 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-76 shows that no more than 34 percent of the existing old-growth in WAA's ever hunted by Edna Bay households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Edna Bay are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative P; and, Timber Production in Alternatives C and D.

Figure 3-76



Sources: 1988 Tongass Resource Use Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Elfin Cove

Located on northwest Chichagof Island, Elfin Cove is a small fishing town with 60 residents. One percent of the population is Alaska Native. The first permanent operations began in 1927, when a fish buyer established a business there. Although the year-round population is small, Elfin Cove is filled with activity during the fishing season. Many Pacific Northwest fishing vessels use the cove during the summer months. A fish buyer, store, and restaurant operate seasonally. Elfin Cove is still a base for fishing in the Icy Straits area.

Economy

Principal economic sectors for Elfin Cove include fisheries, educational services, and transportation, communications, and utilities. Employment is highly seasonal in all sectors. The average per capita income of Elfin Cove is $8,000 per year, one of the lowest in Southeast Alaska (TRUCS, 2/89).

Opinions

A number of Elfin Cove residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Elfin Cove residents who responded to the issues requested that the current timber sale program be reduced and that the long-term contracts be terminated. Those providing oral testimony do not want logging or roads in the vicinity of Elfin Cove. They want current logging practices changed to selective harvest and logging to continue only in those areas currently roaded and logged. They stated that logging should be the last consideration when looking at economic and lifestyle priorities.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 30 percent and deer and finfish other than salmon at 27 and 23 percent, respectively, are the most important subsistence resources for Elfin Cove households (Kruse and Frazier, 1988). Elfin Cove hunters travel an average of six miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include roads, clearcuts of any age, or grassy meadows and more likely to hunt in areas that include old-growth forest, muskeg, open beach, or areas above tree line (Kruse and Frazier, 1988).

Appendix K provides detailed information regarding the areas that Elfin Cove households have ever used to harvest deer. Summarizing, the majority of Elfin Cove households hunt deer in Wildlife Analysis Area (WAA) 3421. This WAA is roadless. As displayed on the Subsistence map, this area is close to the community. Portions of the area are also a recreation place. In terms of number of deer harvested, the most successful deer hunting occurred in WAA 3421 (40 deer) (ADF&G, 1989). This WAA is roadless (Appendix K).

Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 63 percent of the total edible pounds of subsistence resources harvested by Elfin Cove households (Kruse and Frazier, 1988).

Figure 3-77 displays the abundance, distribution and competition for deer only for the WAA's where Elfin Cove hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Elfin Cove and other subsistence hunters, will

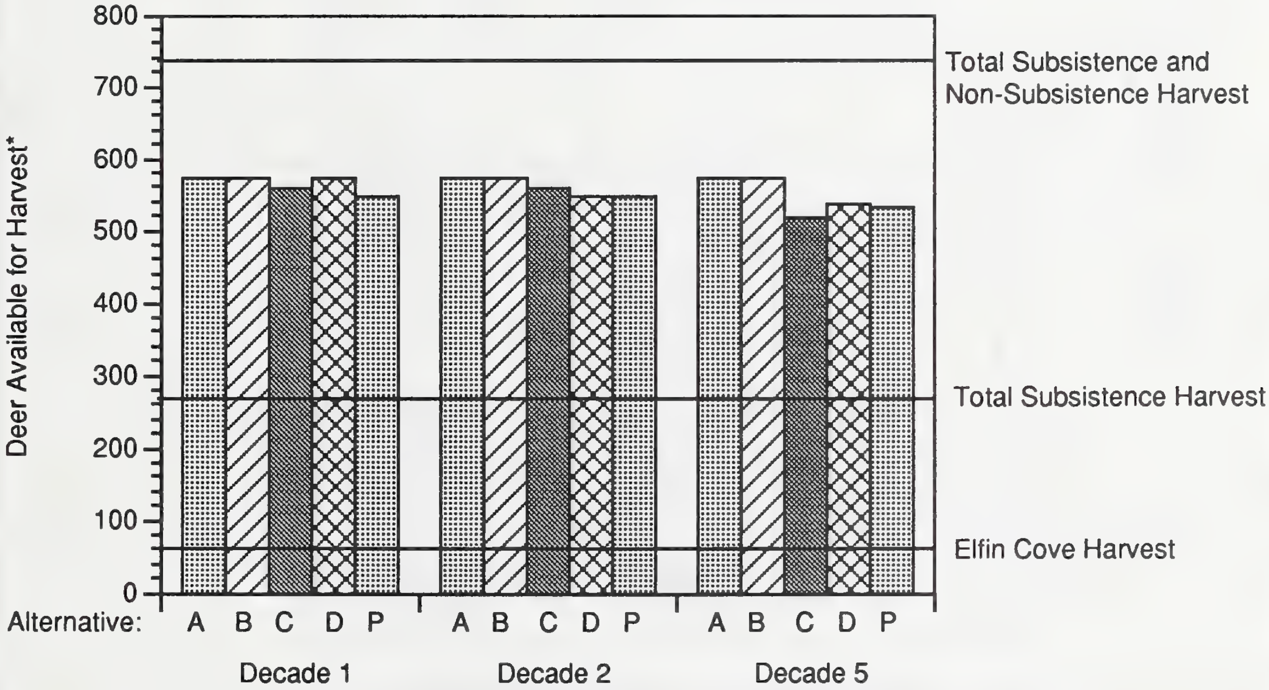
be met in each alternative for the next 50 years. Deer accounts for 27 percent of the total edible pounds of subsistence resources harvested by Elfin Cove households (Kruse and Frazier, 1988).

The predicted need for deer for non-subsistence users cannot be met in any alternative for any decade at 10 percent of the habitat capability in those WAA's where Elfin Cove hunters successfully harvested deer. Similarly, considering all the WAA's ever hunted by Elfin Cove residents, only the predicted need for deer for subsistence users can be met. The predicted need for non-subsistence hunters cannot be met in any alternative at 10 percent of the habitat capability. However, at 20 percent of habitat capability, the predicted need for deer for both subsistence and non-subsistence hunters can be met in all alternatives for the next 50 years.

The WAA where the majority of Elfin Cove households hunt deer most successfully (3421) is allocated primarily to land use designations that allow timber harvesting.

Figure 3-77

Deer Availability and Anticipated Harvest in Areas Used by Elfin Cove Households*



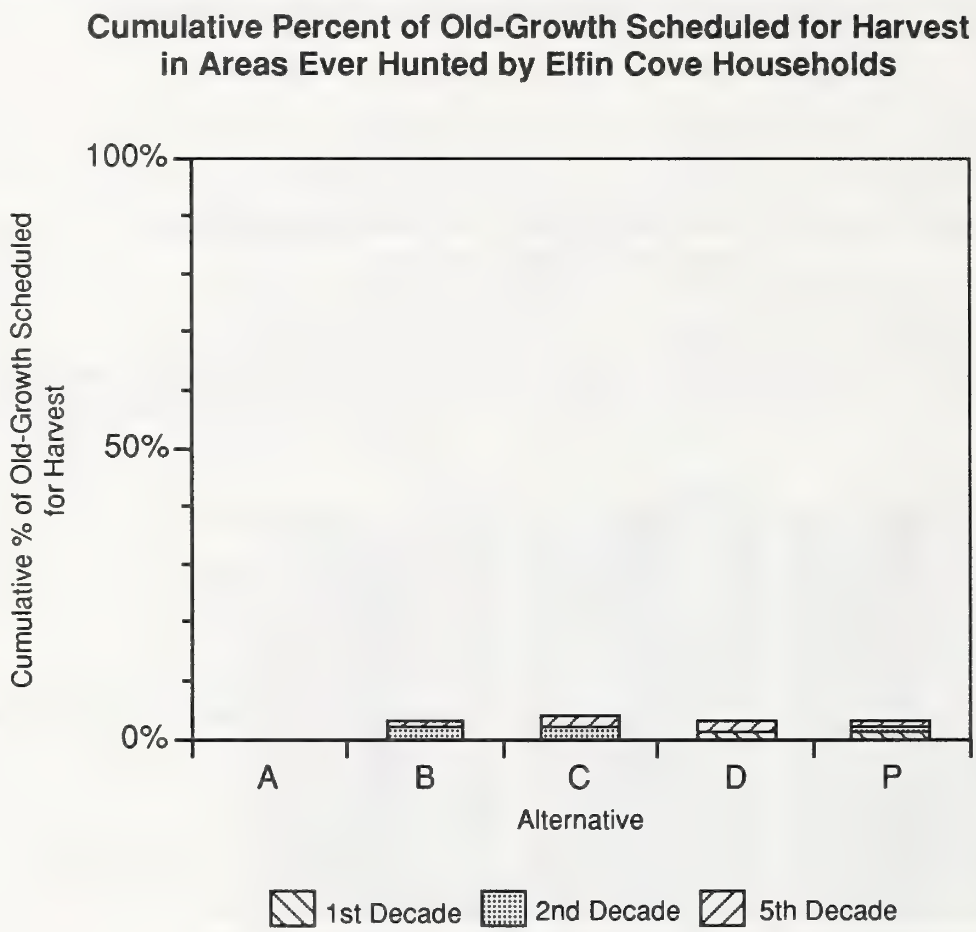
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (5 WAA's). Analysis does not include those WAA's (9 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-78 shows that no more than 5 percent of the existing old-growth in WAA's ever hunted by Elfin Cove households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Elfin Cove are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative P; and, Timber Production in Alternatives C and D.

Figure 3-78



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Gustavus

Gustavus is located in northern Southeast Alaska on the north shore of Icy Straits east of the entrance to Glacier Bay; its population is 158. Eight percent of the population is Alaska Native (TRUCS, 2/89). At the turn of the century, a group of agricultural homesteaders established Gustavus. They supplied meat and produce to Juneau until the 1950's. World War II brought development to Gustavus in the form of an airstrip and Federal Aviation Administration communications facilities. Due to Juneau's airport being fogbound much of the time, Gustavus was also the refueling point for commercial airlines on their way from Seattle to Anchorage. Nearby Glacier Bay National Park was established in 1937. In recent years, Gustavus has developed primarily as a fishing and agricultural community and as the main air access point for the National Park.

Economy

TRUCS (1987) found fisheries, entertainment, recreation and tourist services, and transportation, communications and utilities to be Gustavus's principal economic sectors. Gustavus's economy is highly seasonal in all sectors. The average per capita income for Gustavus residents in 1987 was $12,800; one of the highest in Southeast Alaska (TRUCS, 2/89).

Opinions

A number of Gustavus residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Gustavus residents who responded to the issues requested that additional emphasis be placed on scenic quality, recreation, fish, old-growth habitat around their community, and subsistence. They want the current timber sale program reduced and the long-term contracts terminated. Those who responded do not want additional roads, log transfer facilities, or connection to other existing roads and favor existing emphasis on mineral exploration and development. Respondents requested that management emphasize tourism, fishing wildlife, recreation, scenic quality and subsistence in and around their community.

Subsistence and Recreation Use

Based on edible pounds harvested, finfish other than salmon at 31 percent, deer at 26 percent and salmon at 21 percent are the most important subsistence resources for Gustavus households (Kruse and Frazier, 1988). Gustavus hunters travel an average of eight miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include roads, clearcuts of any age, or areas above tree line and more likely to hunt in areas that include old-growth forest, muskeg, grassy meadow, or open beaches (Kruse and Frazier, 1988).

Appendix K provides detailed information regarding the areas that Gustavus households have ever used to hunt deer. Summarizing, the majority of Gustavus households hunt deer in Wildlife Analysis Areas (WAA's) 4222, 4252, and 4256. These WAA's are virtually roadless. As displayed on the Subsistence map, these areas are relatively close to the community and the majority of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 4256 (62 deer), 4222 (23 deer) and 4252 (17 deer) (ADF&G). These WAA's are virtually roadless with exception of WAA 4252 which is Sealaska Corporation land (Appendix K).

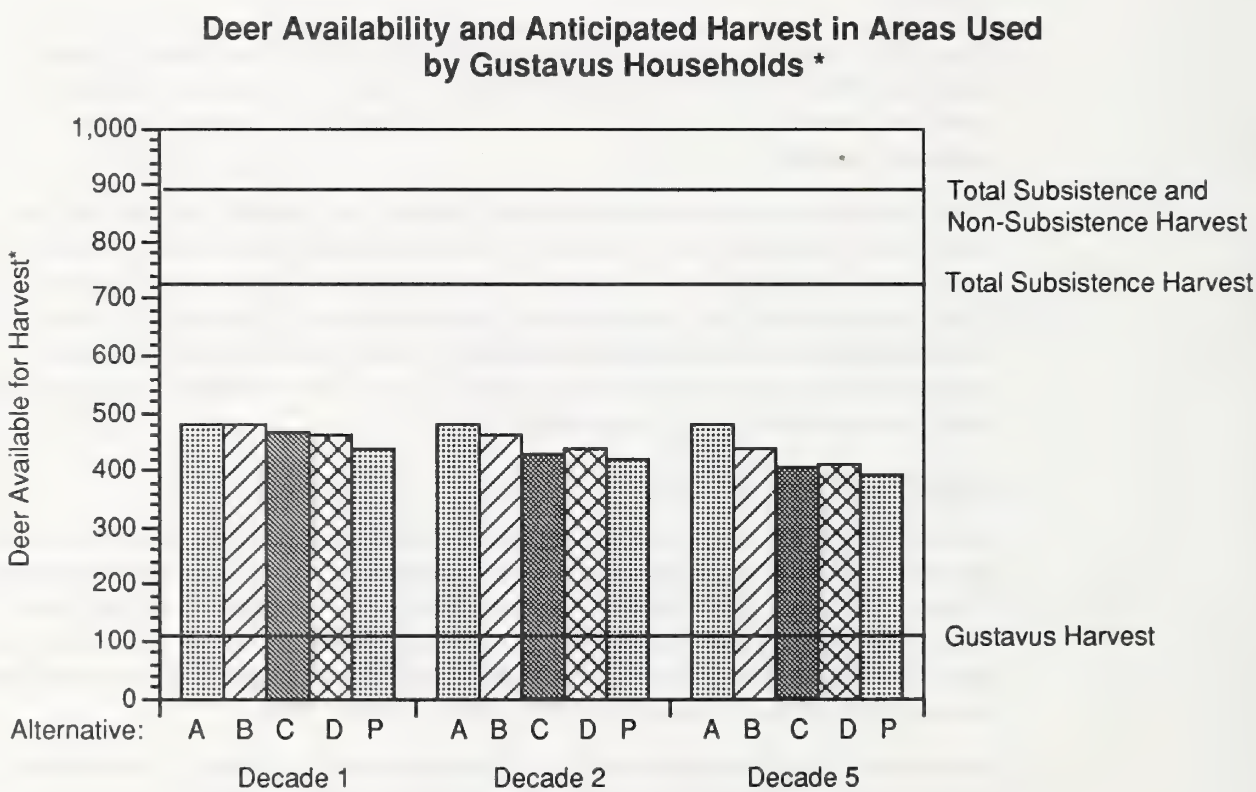
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 70 percent of the total edible pounds of subsistence resources harvested by Gustavus households (Kruse and Frazier, 1988).

Figure 3-79 displays the abundance, distribution and competition for deer only for the WAA's where Gustavus hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Gustavus hunters, will be met in each alternative for the next 50 years. Deer accounts for 26 percent of the total edible pounds of subsistence resources harvested by Gustavus.

The predicted need for deer for subsistence hunters other than Gustavus and for non-subsistence hunters cannot be met in any alternative, any decade, at 10 percent of the harvest capability for WAA's successfully hunted by Gustavus households.

Figure 3-79



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (4 WAA's). Analysis does not include those WAA's (20 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Considering all the WAA's ever hunted by Gustavus residents, the predicted need for deer for all subsistence users can be met in all alternatives except Alternative P in the second decade and Alternatives C, D and P in the fifth decade. However, the predicted need for non-subsistence hunters cannot be met in any alternative at 10 percent of the habitat capability. At 20 percent of habitat capability, the predicted need for deer can be met for all hunters in all alternatives for the next 50 years.

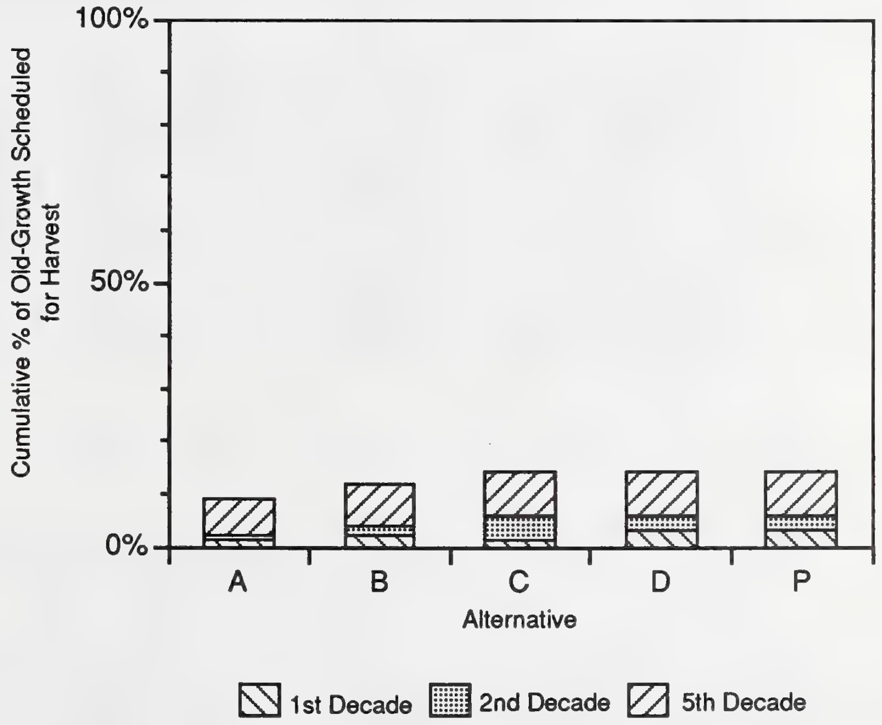
With one exception, WAA's where the majority of Gustavus households hunt deer and where they are most successful (4222, 4252, 4256) are allocated primarily to land use designations that do not allow timber harvesting. Timber harvesting is allowed in Alternatives B, C, D and P for WAA 4252.

Figure 3-80 shows that no more than 14 percent of the existing old-growth in WAA's ever hunted by Gustavus households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Gustavus are allocated to Wilderness or natural setting land use designations in Alternatives A, B and D; and Wilderness or Scenic Viewshed or Modified Landscape in Alternatives C and P.

Figure 3-80

Cumulative Percent of Old-Growth Scheduled for Harvest in Areas Ever Hunted by Gustavus Households



Sources: 1988 Tongass Resource Use Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Haines

Haines is located in the northern portion of Southeast Alaska near the north end of Lynn Canal on the Chilkat Peninsula. It is surrounded by State land. The Tongass lies to the south. Haines is one of three Southeast communities connected by road to Canada and the Lower 48. The other two communities are Hyder and Skagway. The population of the city is 1,154; the outer Haines area is home to 684 people. Alaska Natives comprise 9 percent of the Haines area population.

Originally the Haines area was settled by the Chilkat Tlingits. These Natives are now divided into two groups: the Chilkats of the Chilkat River, with Klukwan being the major population center, and the Chilkoots living in and near Haines. Haines itself was a trade center and mission site. The Haines lumber mill, which had been closed, reopened in November 1988. The new mill, called Chilkoot Lumber, currently employs 100 workers and produces chips, cants, and dimensional lumber. Presently, most of the timber supply for this mill comes from the Stikine and Ketchikan Areas of the Tongass.

Economy

Haines' principal economic sectors are retail trade, construction, fisheries, and business and repair services. Its economy is highly seasonal in the retail, fishing, forestry, construction, and tourism sectors. Haines' average per capita income is $12,500; one of the higher per capita incomes in Southeast Alaska (TRUCS, 2/89).

Opinions

A number of Haines residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Opinion in Haines was split regarding recreation management with half wanting more emphasis on recreation and half satisfied with the current mix of emphasis. Residents who responded to the issues recommended that old-growth habitat near their community be maintained and that more emphasis be placed on subsistence. They were divided on timber management with some wanting less emphasis, some wanting the current emphasis and some wanting more emphasis to support the local mills. Those who responded do not want additional roads or additional log transfer facilities nor do they want to be connected to existing roads.

Subsistence and Recreation Use

Based on edible pounds harvested, finfish other than salmon at 36 percent, salmon at 27 percent, and deer at 15 percent are the most important subsistence resources for Haines households (Kruse and Frazier, 1988). Haines hunters travel an average of 120 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include clearcuts of any age, areas above tree line, or roads and more likely to hunt in areas that include old-growth forest, muskeg, open beach, or grassy meadows (Kruse and Frazier, 1988).

Appendix K provides detailed information regarding the areas that Haines households have ever used to hunt deer. Summarizing, the majority of Haines households hunt deer in 35 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 3524, 3835, and 4253 are most heavily used. These WAA's are 4, 0 and 12 percent accessible via existing roads. As displayed on the Subsistence map, these areas are quite a distance from the community and, with exception of WAA 4253, a relatively small portion of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 4222 (98 deer) and 4253 (38 deer) (ADF&G, 1989). These WAA's are 2 and 12 percent accessible via existing roads (Appendix K).

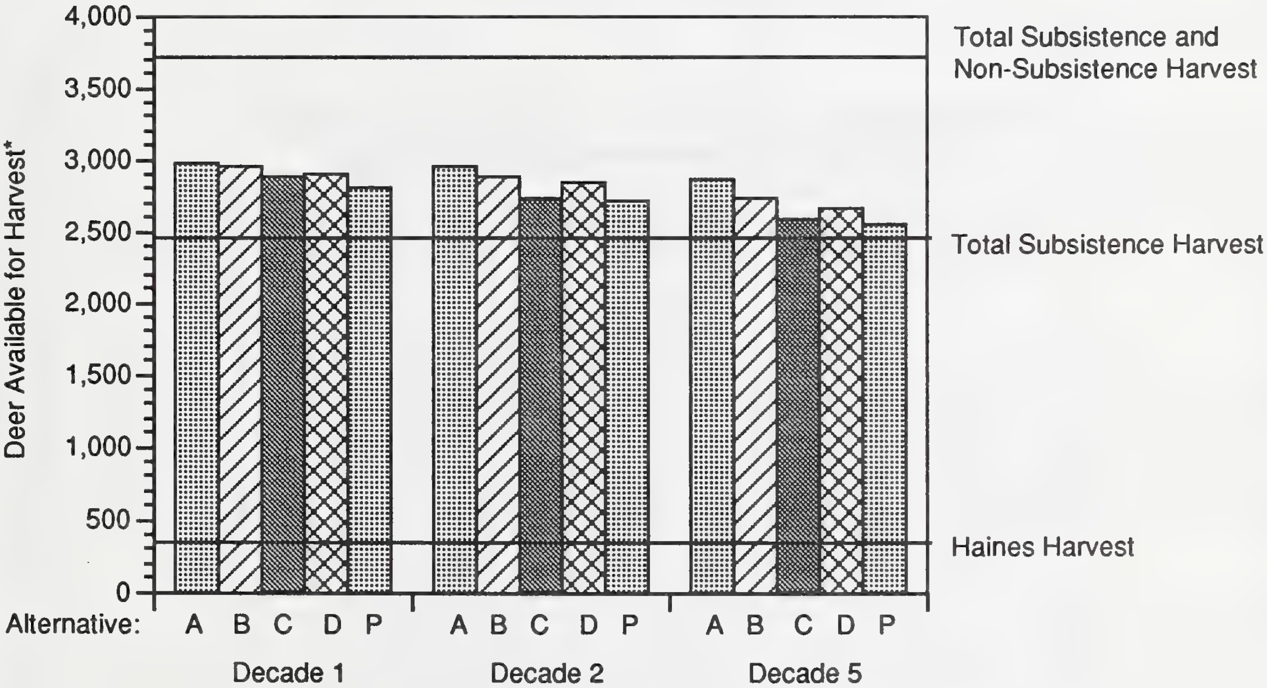
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 68 percent of the total edible pounds of subsistence resources harvested by Haines households (Kruse and Frazier, 1988).

Figure 3-81 displays the abundance, distribution and competition for deer only for the WAA's where Haines hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Haines and all other subsistence users will be met in each alternative for the next 50 years. Deer accounts for 15 percent of the total edible pounds of subsistence resources harvested by Haines households (Kruse and Frazier, 1988).

Figure 3-81

Deer Availability and Anticipated Harvest in Areas Used by Haines Households *



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (19 WAA's). Analysis does not include those WAA's (54 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

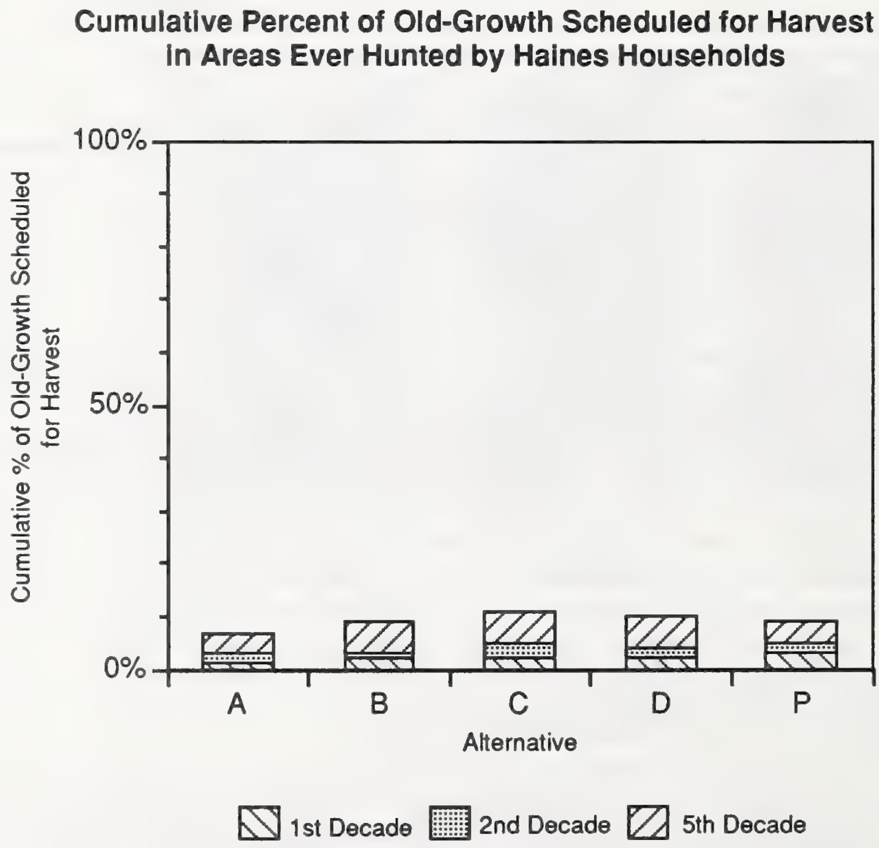
The predicted need for deer for non-subsistence users cannot be met in any alternative at 10 percent of the habitat capability in those WAA's where Haines hunters successfully harvested deer. Similarly, considering all the WAA's ever hunted by Haines residents, only the predicted need for deer for subsistence users can be met. The predicted need for non-subsistence hunters cannot be met in any alternative at 10 percent of the habitat capability. However, at 20 percent of the habitat capability, the predicted needs for deer for subsistence and non-subsistence hunters can be met in all alternatives for the next 50 years.

WAA's where the majority of Haines households hunt deer (3524, 3835, 4253) are allocated primarily to land use designations that allow timber harvesting. The exception is WAA 4253 for which timber harvesting is not allowed in Alternative A. Timber harvesting is also not allowed in any alternative for WAA 4222; one of the most successful deer hunting areas for Haines.

Figure 3-82 shows that no more than 11 percent of the existing old-growth in WAA's ever hunted by Haines households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Haines are allocated to land use designations that do not allow timber harvesting in all alternatives.

Figure 3-82



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Hollis

Hollis is located on East Prince of Wales Island in West Kasaan Bay. The population is 82 with 18 percent being Alaska Natives. Settlement at Hollis began as a mining camp at the turn of the century then developed into a logging camp when logging began in the nearby Maybeso Valley in the mid-1950's. In 1960, when Thorne Bay became center of the logging industry on central Prince of Wales, most Hollis residents moved to Thorne Bay. In recent years, Hollis has once again developed as a community, due in part to location of an Alaska Marine Highway terminal there. Roads now connect Hollis with most other communities on Prince of Wales.

Economy

Hollis' principle economic sectors include timber, construction, transportation services, highway maintenance, fishing, schools, and retail trade. The economy is highly seasonal in all sectors except government. The average income is $23,478 which is the highest in Southeast Alaska (TRUCS, 2/89).

Opinions

A number of Hollis residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

The Hollis Community Council, Inc. requested that additional emphasis be placed on managing for scenic resources, recreation, fish. They indicated that current emphasis on subsistence is adequate and express opposition for timber harvest north of their community. The Council requested that the current timber sale program be reduced, and that the long-term contracts be terminated.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 27 percent, deer at 23 percent and finfish other than salmon at 22 percent are the most important subsistence resources for Hollis households (Kruse and Frazier, 1988). Hollis hunters travel an average of 20 miles to their most reliable deer hunting areas. They are less likely to hunt open beaches or areas that include clearcuts of any age or areas above tree line and more likely to hunt in areas that include old-growth forest, muskeg, roads, or grassy meadows (Kruse and Frazier, 1988).

Appendix K provides detailed information regarding the areas that Hollis households have ever used to hunt deer. Summarizing, the majority of Hollis households hunt deer in 14 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1003, 1317, and 1421 are most heavily used. These WAA's are 83, 33 and 45 percent accessible via existing roads. Displayed on the Subsistence map, WAA 1317 is closest to the community and portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 1316 (3 deer) and 1317 (2 deer) (ADF&G, 1989). These WAA's are 1 and 36 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 65 percent of the total edible pounds of subsistence resources harvested by Hollis households (Kruse and Frazier, 1988).

Figure 3-83 displays the abundance, distribution and competition for deer only for the WAA's where Hollis hunters successfully harvested deer. (This does not include every WAA where

community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both all subsistence hunters will be met in each alternative for the next 50 years. Deer accounts for 23 percent of the total edible pounds of subsistence resources harvested by Hollis households (Kruse and Frazier, 1988).

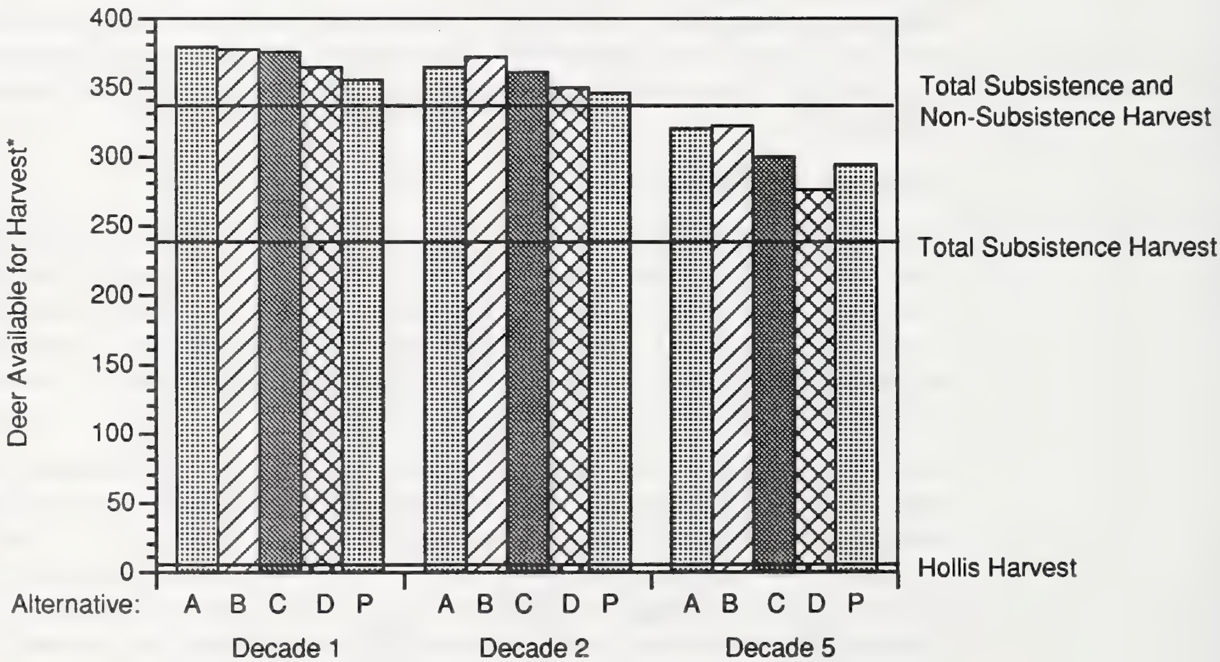
The predicted need for deer for non-subsistence users will be met for the next 20 years in all alternatives. However non-subsistence needs cannot be met in any alternative in the fifth decade at 10 percent of the habitat capability in WAA's successfully hunted by Hollis residents. Deer is a prey species for wolves and exist in WAA's hunted by Hollis residents. Wolves, therefore, are competition for the deer that are available for harvest.

Considering all the WAA's ever hunted by Hollis residents, all subsistence and non-subsistence needs for deer can be met at 10 percent of the habitat capability.

With one exception, WAA's where the majority of Hollis households hunt deer (1003, 1317, 1421) and are successful (1316, 1317) are allocated primarily to land use designations that allow timber harvest. Timber harvesting is not allowed in WAA 1316 in any alternative.

Figure 3-83

Deer Availability and Anticipated Harvest in Areas Used by Hollis Households *



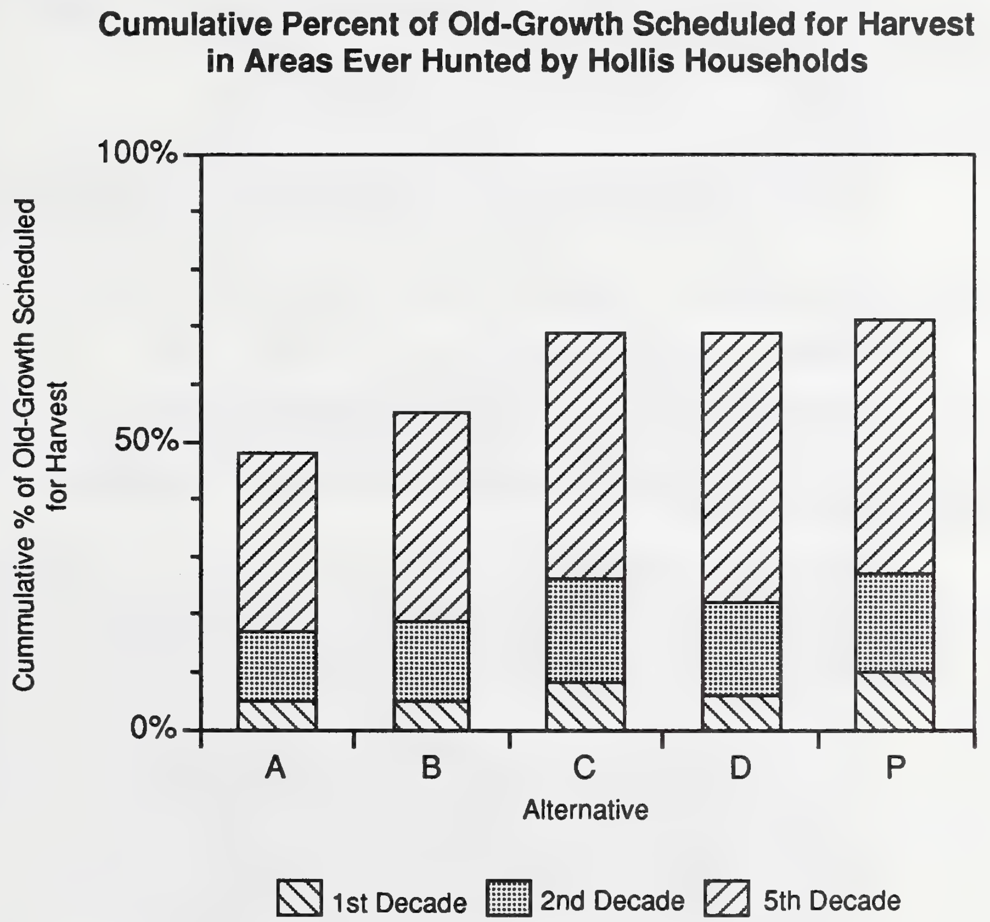
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (3 WAA's). Analysis does not include those WAA's (17 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-84 shows that between five percent (Alternative A, first decade) and 47 percent (Alternative D, fifth decade) of the existing old-growth in WAA's ever hunted by Hollis households will be harvested.

The majority of recreation places near Hollis are allocated to land use designations that do not allow timber harvesting in Alternatives A, B and D; and, to designations that do allow timber harvesting in Alternatives C and P.

Figure 3-84



Sources: 1988 Tongass Resource Use Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Hoonah

Hoonah is located along Icy Strait on the northeast shore of Chichagof Island. Hoonah is the principal Tlingit village for the Glacier Bay/Icy Straits areas. Sixty-two percent of its population of 736 is Alaska Native.

Tlingit Indians of the Glacier Bay area were forced from their homes by the last glacial advance. One group settled near the mouth of Port Frederick and established Hoonah. They were primarily a hunting people and lived off the varied resources of the area. Commercial fishing began with the development of canneries near Hoonah in the early 1900's. Recently, Hoonah has become the center of logging activities on north Chichagof Island, and a logging camp has been constructed nearby. Logging is taking place on National Forest System Lands and Sealaska land and has been concluded on land owned by the Huna Totem Corporation, the ANCSA village corporation in 1989. A religious farming community has been established at Game Creek, just south of Hoonah.

Economy

Hoonah's principal economic sectors are fish and fish processing, retail trade, and forestry. Its economy is highly seasonal in all sectors. The average per capita income of Hoonah is $9,000 per year (TRUCS, 2/89). Subsistence is a part of many residents' lifestyles and cultural heritage. Most families rely on traditional food gathering for a substantial part of their diets (Alaska Department of Community and Regional Affairs, 1983).

Opinions

A number of Hoonah residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Hoonah residents who commented on the issues responded favorably to harvesting timber along Alaska Marine Highway routes, roads, streams and around their community. Opinion regarding recreation was split with half wanting more emphasis on recreation and half satisfied with the current mix of emphasis. Respondents want additional emphasis placed on fish and on old-growth habitat near their community. Hoonah City Council requested that subsistence resources be emphasized. Some individual respondents want the current timber sale program to continue and believe the Forest Service has an obligation to maintain local and regional economies. Others said they want the current amount of logging reduced. Some people questioned the emphasis given to the long-term sales. They want more provisions for short-term or small business administration sales stating that these are better for the future of the industry. They favor additional roads, transfer facilities and encourage connecting existing roads. They want the tourism, recreation, and fishing economic sectors emphasized.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 26 percent, deer at 23 percent and finfish other than salmon at 19 percent are the most important subsistence resources for Hoonah households (Kruse and Frazier, 1988). Hoonah hunters travel an average of 15 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include clearcuts of any age, roads, or grassy meadows and more likely to hunt in areas that include muskeg, old-growth forests, or areas above tree line (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Hoonah households have ever used to hunt deer. Summarizing, the majority of Hoonah households hunt deer in six Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 3524, 3551, and 4253

are most heavily used. These WAA's are 4, 35 and 12 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 4252 (119 deer), 3523 (106 deer) and 3524 (93 deer) (ADF&G, 1989). These WAA's are 12, 22 and 4 percent accessible via existing roads (Appendix K).

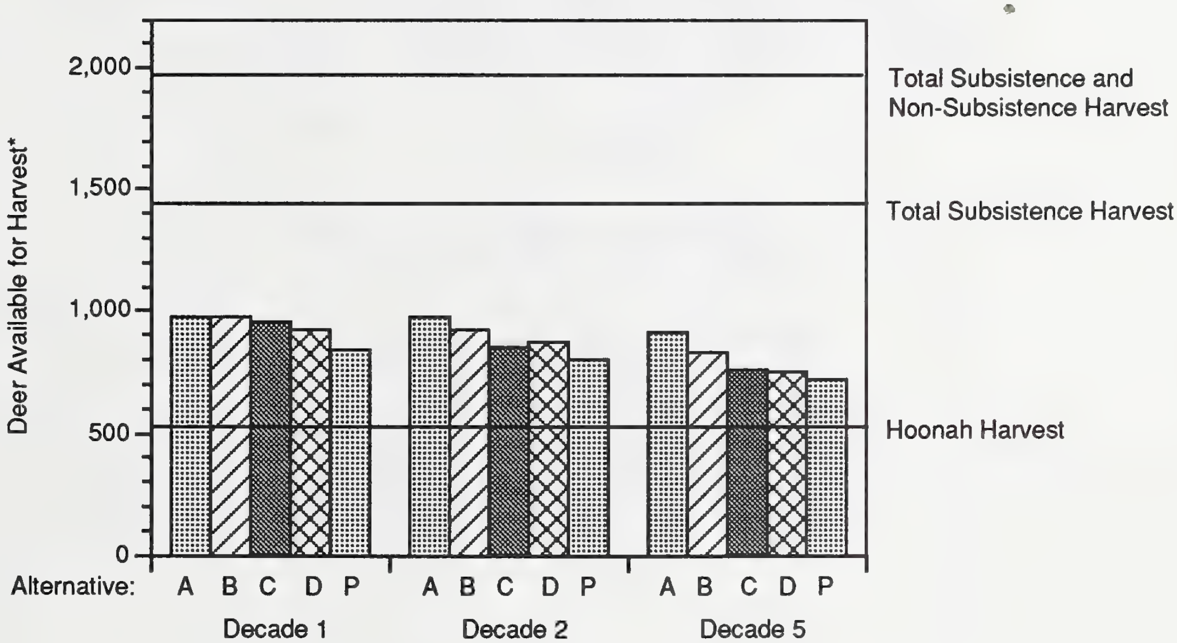
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 59 percent of the total edible pounds of subsistence resources harvested by Hoonah households (Kruse and Frazier, 1988).

Figure 3-85 displays the abundance, distribution and competition for deer in all the WAA's where Hoonah hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Hoonah will be met in each alternative for the next 50 years. Deer accounts for 23 percent of the total edible pounds of subsistence resources harvested by Hoonah households (Kruse and Frazier, 1988).

Figure 3-85

Deer Availability and Anticipated Harvest in Areas Used by Hoonah Households *



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (8 WAA's). Analysis does not include those WAA's (31 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

The predicted need for deer for subsistence users other than Hoonah and for non-subsistence users cannot be met in any alternative at 10 percent of the habitat capability in those WAA's where Hoonah hunters successfully harvested deer. Considering all the WAA's ever hunted by Hoonah residents, only the predicted need for deer for subsistence users can be met. The predicted need for non-subsistence hunters cannot be met in any alternative at 10 percent of the habitat capability.

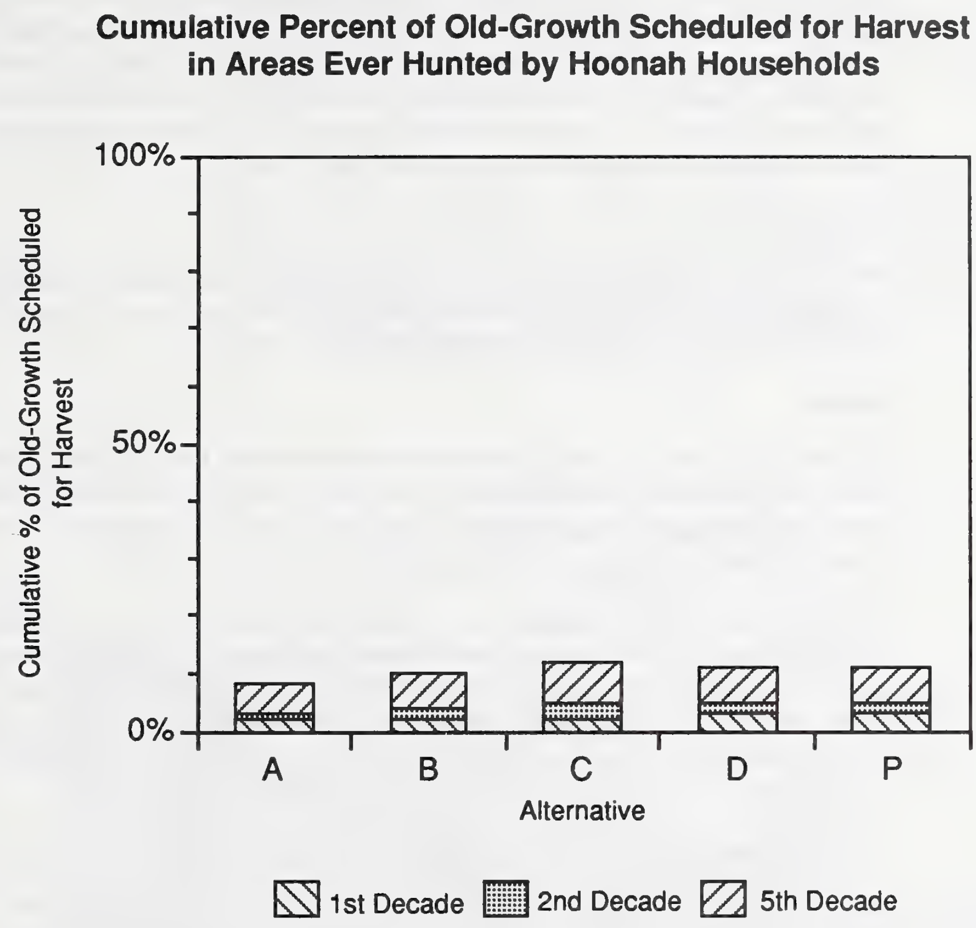
At 20 percent of the habitat capability, non-subsistence needs for deer cannot be met in those WAA's successfully hunted by Hoonah households. However, non-subsistence needs can be met at 20 percent of the habitat capability in WAA's ever hunted by Hoonah households.

WAA's where the majority of Hoonah households hunt deer (3524, 4253) are allocated primarily land use designations that allow timber harvesting. The exception is Alternative A for WAA 4253. Another WAA heavily hunted by Hoonah households is not part of the Tongass National Forest; 3551. WAA's where Hoonah hunters most successfully harvested deer (3523, 3524, 4252) are allocated to several different land use designations. Alternatives A, B and C for WAA 3523 do not allow timber harvesting nor does Alternative A for WAA 4252. Other alternatives for these WAA's do allow timber harvesting.

Figure 3-86 shows that no more than 12 percent of the existing old-growth in WAA's ever hunted by Hoonah households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Hoonah are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative D; and, Timber Production in Alternatives C and P.

Figure 3-86



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Hydaburg

Located on the southwest side of Prince of Wales Island, Hydaburg has a population of 379. Eighty-seven percent of this population is Alaska Native (TRUCS, 2/89).

During the seventeenth century, Haida Indians left the Queen Charlotte Islands and eventually settled on southern Prince of Wales Island. By 1910, there were three Haida population centers on Prince of Wales Island; in 1911 these villages combined to form Hydaburg which developed into a fishing community. Seafood processing was active from 1938 until 1982 when a fire destroyed the cannery. A new seafood processing plant was built and is expected to result in future economic and population growth.

Economy

TRUCS (1987) lists the major sectors of Hydaburg's economy as fisheries, forestry, and educational services. Employment is highly seasonal in all these sectors. The average per capita income for Hydaburg is $7,000 (TRUCS, 2/89).

Opinions

A number of Hydaburg residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Hydaburg residents who responded to the issues indicated the current mix of management for fish, wildlife and timber harvesting is sufficient and want to see the current timber sale program continued. Similarly, they believe the Forest Service has an obligation to maintain local and regional economies by continuing the long-term timber sale contracts. They are generally satisfied with existing road management and emphasis on mineral exploration and development.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 40 percent, finfish other than salmon at 16 percent and deer at 13 percent are the most important subsistence resources for Hydaburg households (Kruse and Frazier, 1988). Hydaburg hunters travel an average of 18 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include roads, or clearcuts of any age and more likely to hunt in areas that include muskeg, old-growth forest, open beach, areas above tree line, or grassy meadows (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Hydaburg households have ever used to hunt deer. Summarizing, the majority of Hydaburg households hunt deer in 10 Widlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1106, 1107, and 1332 are most heavily used. These WAA's are 3, 15 and 16 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community and a very small portion of these areas are also recreation places. In terms of hunting success, Hydaburg harvested the same number of deer (4 deer) from seven WAA's; 901, 1107, 1318, 1323, 1332, 1421 and 1422 (ADF&G, 1989). With exception of WAA 1421 at 44 percent and WAA 1422 at 58 percent, these areas are less than 16 percent roaded. (Appendix K).

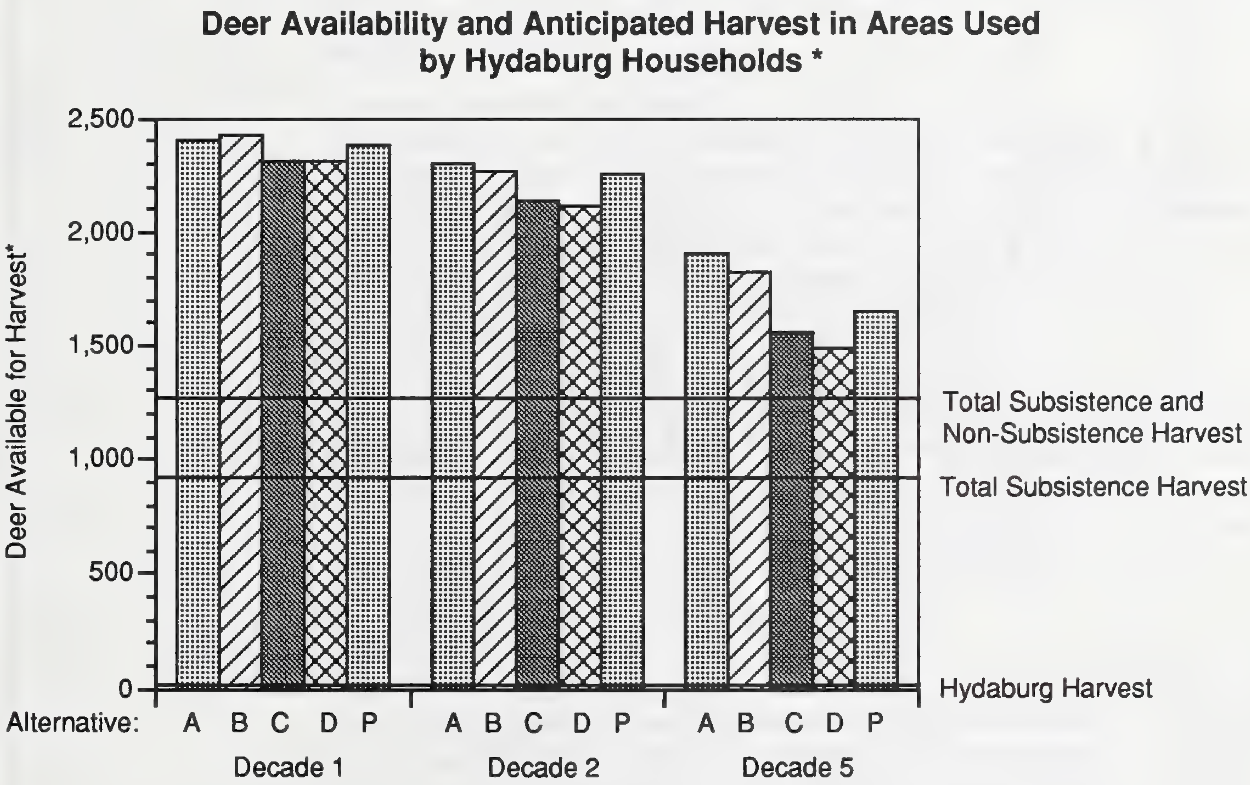
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 80 percent of the total edible pounds of subsistence resources harvested by Hydaburg households (Kruse and Frazier, 1988).

Figure 3-87 displays the abundance, distribution and competition for deer for all the WAA's where Hydaburg hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 13 percent of the total edible pounds of subsistence resources harvested by Hydaburg households (Kruse and Frazier, 1988).

WAA's where the majority of Hydaburg households hunt deer (1006, 1107, 1332) are allocated primarily to land use designations that allow timber harvesting. Exceptions are: Alternatives A and P for WAA 1006; Alternatives A, B and P for WAA 1107; and Alternative A for WAA 1332. WAA's where Hydaburg hunters most successfully harvested deer (901, 1107, 1318, 1323, 1332, 1421, 1422) are also allocated primarily to land use designations that allow timber harvesting. Exceptions are: Alternatives A and B for WAA 901; Alternatives A, B and P for WAA 1107; and, Alternative A for WAA 1332.

Figure 3-87



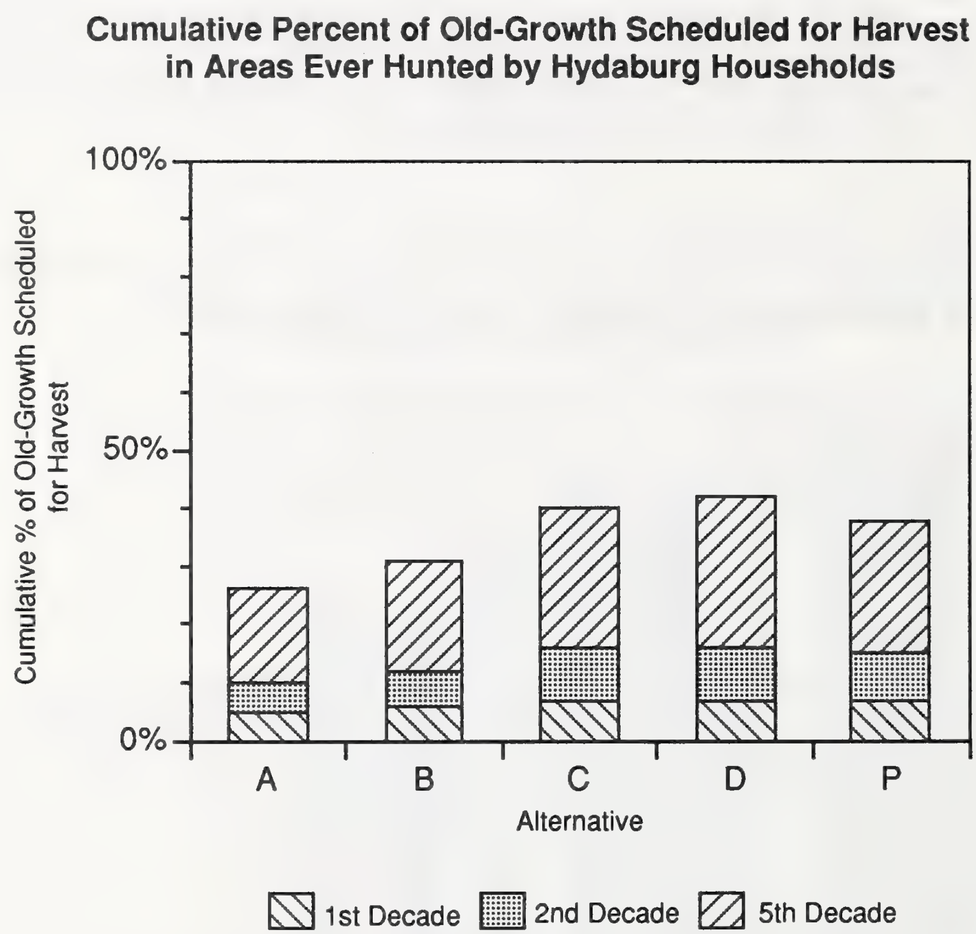
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (8 WAA's). Analysis does not include those WAA's (36 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-88 shows that no more than 34 percent of the existing old-growth in WAA's ever hunted by Hydaburg households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Hydaburg are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative P; and, Timber Production in Alternatives C and D.

Figure 3-88



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Hyder

Located in the southern portion of Southeast Alaska, Hyder is at the northern end of Portland Canal on the fringe of the Misty Fiords National Monument and is less than 2 miles from the town of Stewart, British Columbia. Hyder is one of three communities connected by road to Canada. The other communities are Haines and Skagway. One percent of the population of 78 is Alaska Native.

Hyder began as a mining town before the turn of the century. It developed as a supply point for the Canadian mining district with a small amount of mining also done in the Hyder area. Most mining ended in the late 1950's. Today, tourism is the town's main industry.

Economy

Hyder's main economic sectors are retail trade, construction, transportation, communications, and utilities. Employment is highly seasonal. The average per capita income for Hyder is $6,000 (TRUCS, 2/89).

Opinions

A number of Hyder residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

The Hyder Community Association, Inc. requested that more emphasis be placed on managing for recreation and that additional road access to recreation areas be provided. They also want additional emphasis on fish and recommend that old-growth habitat near communities be maintained for wildlife. The Association indicated that the current emphasis on subsistence is adequate. They responded favorably to additional roads, transfer facilities, connecting existing roads, and placing more emphasis on mineral exploration and development.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 30 percent, finfish other than salmon at 22 percent, and other mammals such as moose and bear at 16 percent are the most important subsistence resources for Hyder households (Kruse and Frazier, 1988). Hyder hunters travel an average of 118 miles to their most reliable deer hunting areas. They are less likely to hunt in areas above tree line or in areas that include clearcuts of any age and more likely to hunt in areas that include muskeg, old-growth forest, grassy meadow, open beach, or roads (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Hyder households have ever used to hunt deer. Summarizing, the majority of Hyder households hunt deer in 13 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1210, 1211, and 1213 are most heavily used. WAA 1211 is 21 percent roaded and the other WAA's are virtually roadless. As displayed on the Subsistence map, these areas are quite a distance from the community and portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA 1421 (2 deer) (ADF&G, 1989). This WAA is 44 percent roaded (Appendix K).

Direct, Indirect and Cumulative Effects

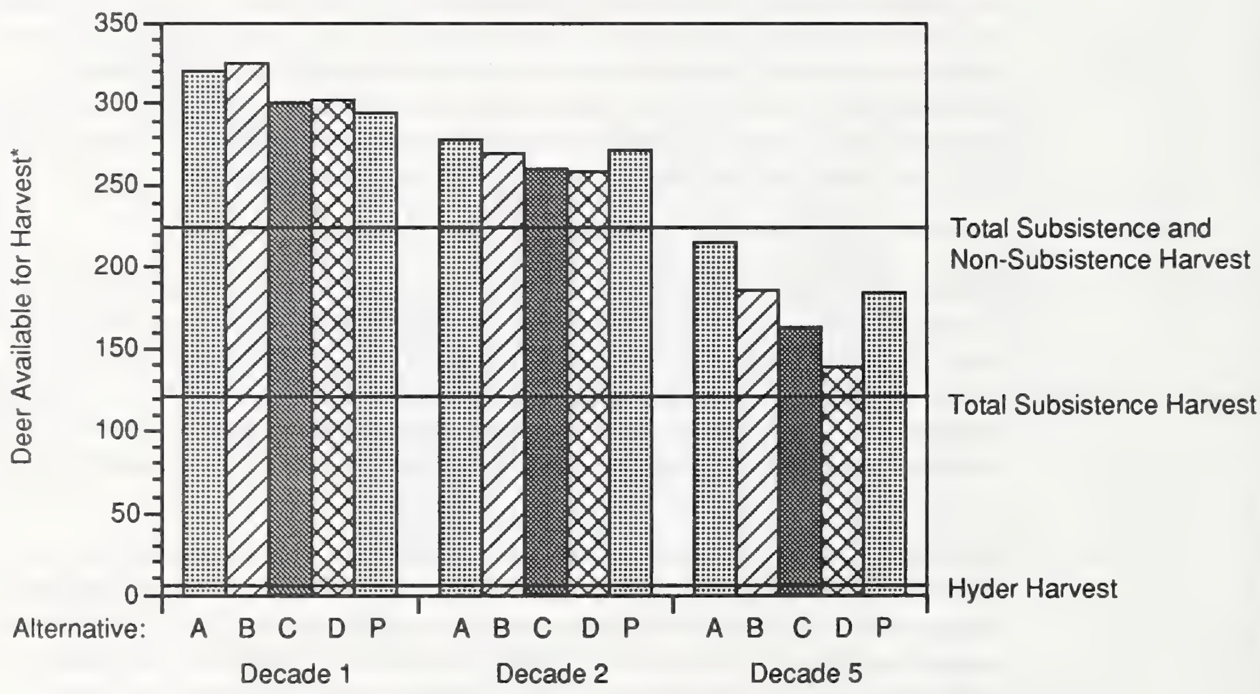
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 80 percent of the total edible pounds of subsistence resources harvested by Hyder households (Kruse and Frazier, 1988).

Figure 3-89 displays the abundance, distribution and competition for deer in all the WAA's where Hyder hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Hyder and other subsistence hunters will be met in each alternative for the next 50 years. Deer accounts for a fraction of the total edible pounds of subsistence resources harvested by Hyder households (Kruse and Frazier, 1988). The predicted need for deer for non-subsistence users can be met in all alternatives for the next 20 years. However, non-subsistence needs cannot be met in any alternative in the fifth decade at 10 percent of the habitat capability in those WAA's where Hyder hunters successfully harvested deer. Considering all the WAA's ever hunted by Hyder residents, the predicted need for deer for non-subsistence users can be met at 10 percent of the habitat capability.

WAA's where the majority of Hyder households hunt deer (1210, 1211, 1213) and where they were most successful (1421) are allocated primarily to land use designations that allow timber harvesting. Exceptions are Alternatives A and B for WAA's 1210 and 1213.

Figure 3-89

Deer Availability and Anticipated Harvest in Areas Used by Hyder Households *



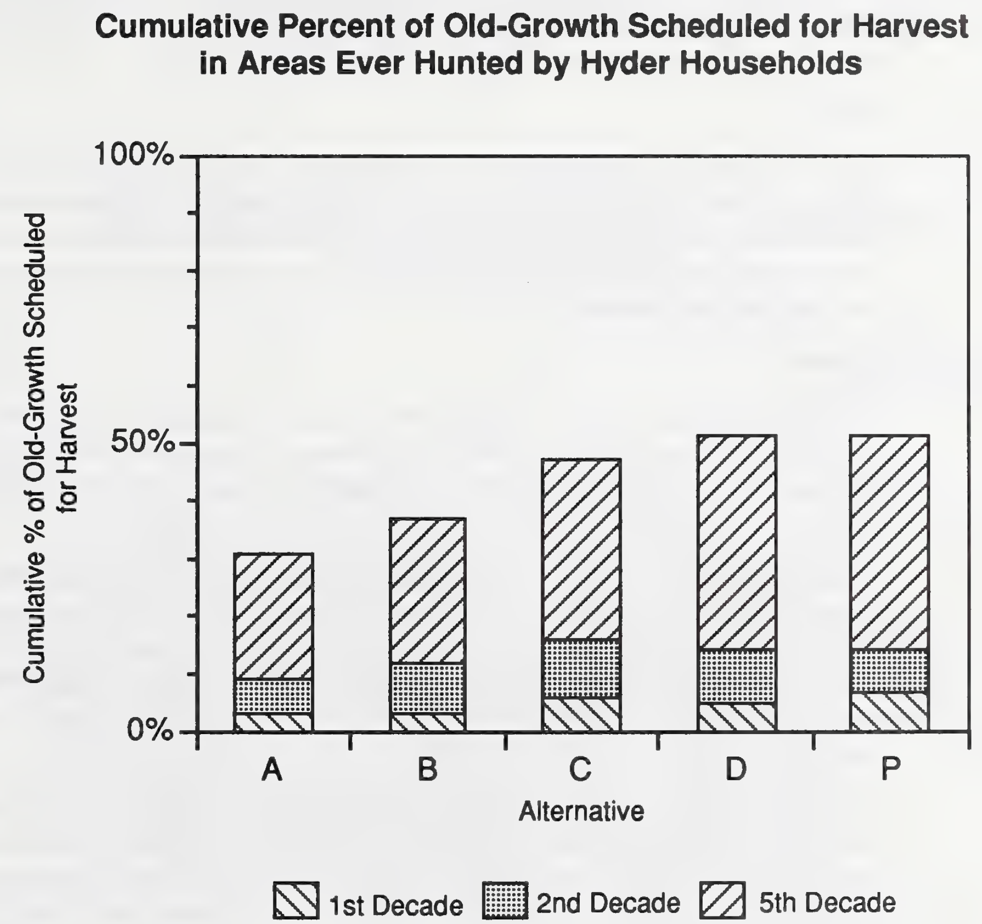
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (WAA). Analysis does not include those WAA's (13 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-90 shows that no more than 10 percent of the existing old-growth in WAA's ever hunted by Hyder households will be harvested.

The majority of recreation places near Hyder are allocated to Wilderness or natural setting land use designations in all alternatives.

Figure 3-90



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2. Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Juneau and Vicinity

The City and Borough of Juneau surrounds the Gastineau Channel. The City and Borough are comprised of three communities: Juneau, Auke Bay, and Douglas. Population in 1987 was 23,799, with 11 percent of this population being Alaska Native (ADF&G Community Profiles, 1987). The 1990 census shows the population above 26,000.

Originally, Tlingit Indians made seasonal and permanent villages along the north and south coast near the present site of Juneau. Gold discovered in the Juneau area started the mining town in 1880 and the settlement grew rapidly. Two of the world's largest lode gold mines produced over $180 million in gold before finally closing in 1944. Juneau has developed as a government and regional services center, with added economic contributions from fishing and tourism.

Economy

Juneau's economy is overwhelmingly supported by government and administration (ADF&G Community Profiles, 1987). Other major sectors include fishing and tourism; minor economic sectors include retail trade, education services, other professional services, construction, and transportation. Mining may soon play an important role due to the new interest in old, previously worked, deposits.

Opinions

A number of Juneau residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Juneau residents who responded to the issues requested that additional emphasis be placed on scenic resources, recreation, fish, wildlife, and subsistence. Juneau residents are split in their opinion of managing the Forest to emphasize timber harvest. Half want the same mix of emphasis, half want less timber harvest. Those who responded favor additional roads, and connecting existing roads. They also expressed support for additional emphasis on access for mineral exploration and development.

Oral testimony offered by Juneau residents reflected considerable differences of opinion. Some believe that timber harvest on the Tongass is occurring at too fast a rate, that subsistence effects are being ignored and that watershed protection is inadequate. Others believe that an inadequate amount of timber is currently offered and that the Forest Service should provide for the expansion of the timber industry.

Hunting and Recreation Use Areas

Juneau is not a subsistence community, consequently, there is no information about the areas where Juneau residents have ever hunted deer. However, Appendix K provides detailed information about the areas that Juneau residents have successfully hunted deer. Summarizing, Juneau residents successfully harvested deer in 59 Wildlife Analysis Areas (WAA's). Based on the number of deer harvested, WAA's 2722, 3836, and 4150 are the most productive. These WAA's are 4, 3 and 0 percent accessible via existing roads (Appendix K). As displayed on the Subsistence map, these areas are close to the community and a large portion of these areas are also recreation places.

Direct, Indirect and Cumulative Effects

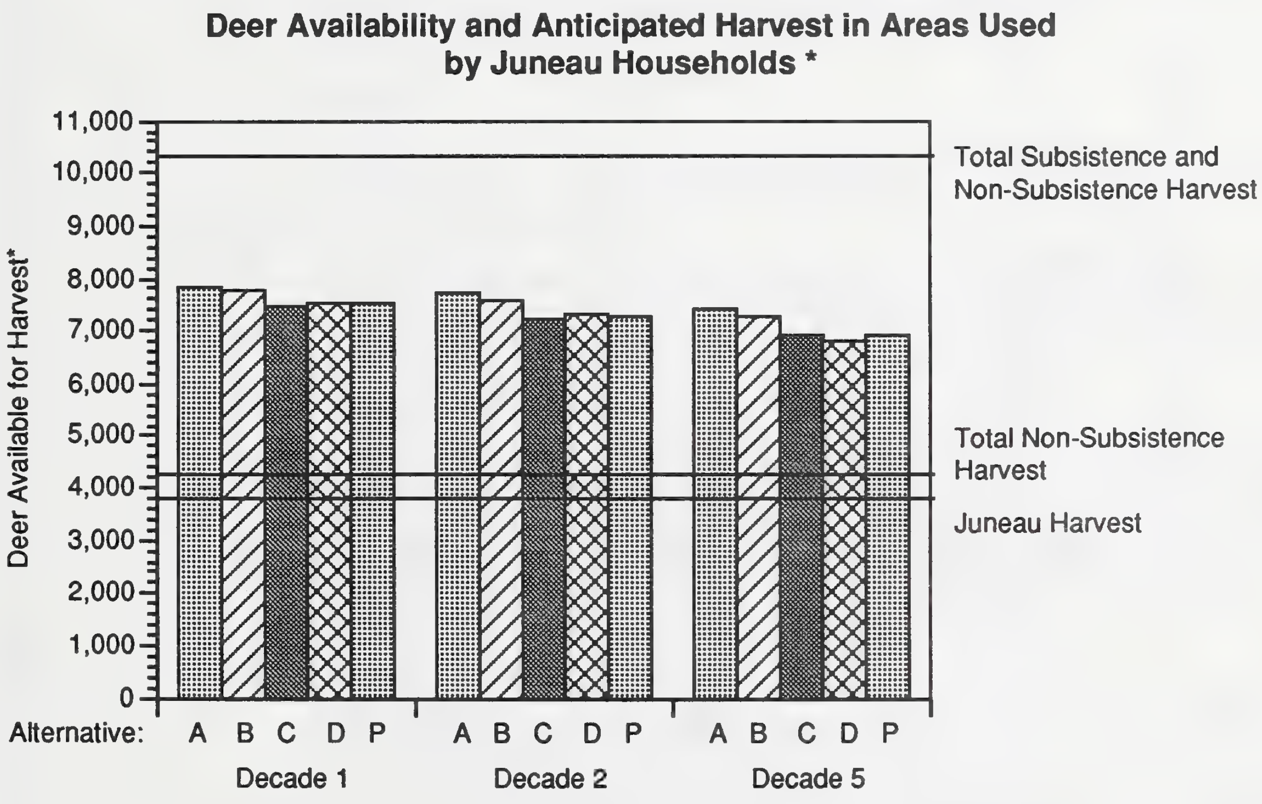
Figure 3-91 displays the abundance, distribution and competition for deer only for the WAA's where Juneau hunters successfully harvested deer. (This does not include every WAA where

community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Juneau and other non-subsistence hunters, will be met in each alternative for the next 50 years. However, the predicted need for deer for subsistence users cannot be met in any alternative at 10 percent of the habitat capability.

However, predicted needs for deer for all hunters can be met in all alternatives for the next 50 years at 20 percent of habitat capability.

WAA's where Juneau hunters were most successful (2722, 3836, 4150) are allocated primarily to land use designations that do not allow timber harvesting. Exceptions are Alternatives C and P for WAA 3836.

Figure 3-91



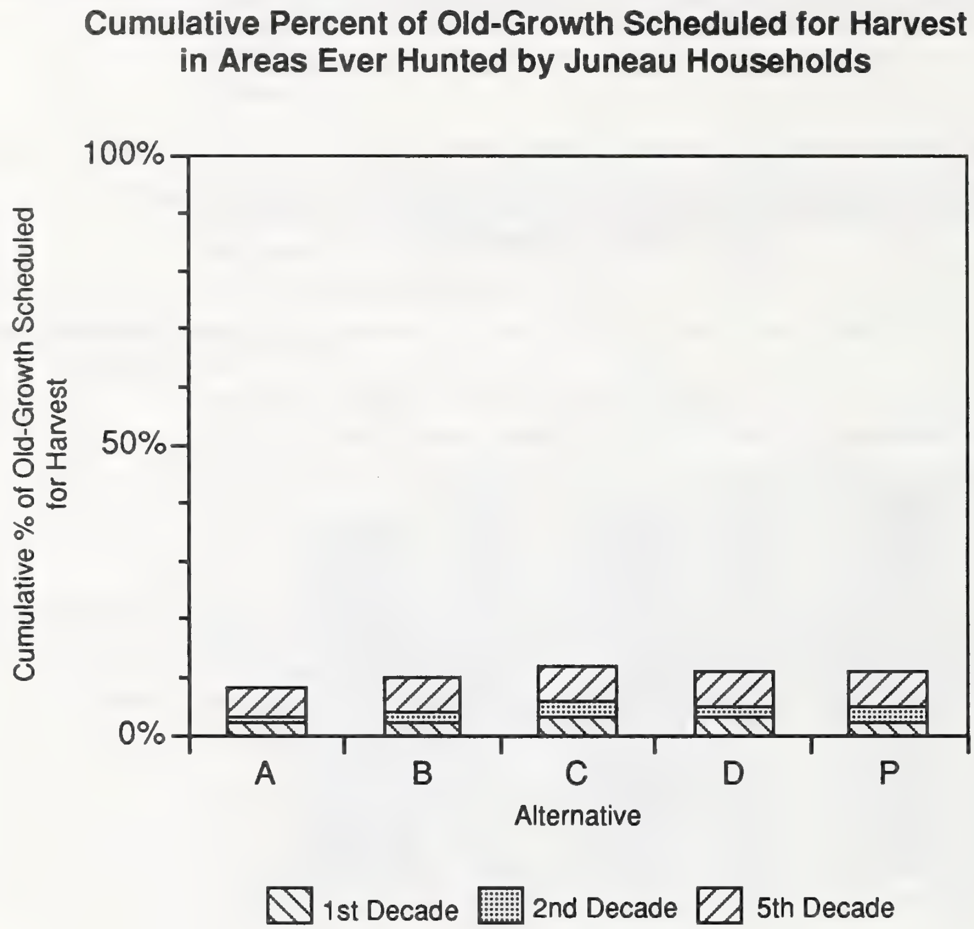
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (59 WAA's). Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-92 shows that no more than 12 percent of the existing old-growth in WAA's ever hunted by Juneau households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Juneau are allocated to Wilderness or natural setting land use designations in all alternatives.

Figure 3-92



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Kake

Located on west Kupreanof Island, Kake has a population of 645 people, 70 percent of whom are Alaska Native.

Tlingit Indians built villages and fishing camps in the Kake area which were consolidated in the late 1800's. Since then, the community has developed an economy based largely on the commercial fishing industry. A school and store were built in 1891; a cannery in 1912. A cold storage, built in 1980, is still in operation. Logging began in the 1940's and continues to provide some employment opportunities for Kake residents. Most of the logging in recent years has taken place on lands owned by the Kake Native Corporation. In the early 1980's Kake experienced a severe housing shortage.

Economy

Kake's major economic sectors are fishing and fish processing, and transportation, communications, and education services. Employment is highly seasonal. Much of Kake's population depends on subsistence fishing and hunting. Kake's average per capita income is $9,000 (TRUCS, 2/89).

Opinions

A number of Kake residents offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Kake Tribal Corporation and the Kake District Commissioner for Subsistence expressed concern for Security, Rowan, Pillar, Tebenkoff and Kadake Bays indicating these are important subistence use areas particularly for salmon. They do not want logging in these areas.

Subsistence and Recreation Use

Based on edible pounds harvested, deer at 24 percent, salmon at 22 percent and finfish other than salmon at 21 percent are the most important subsistence resources for Kake households (Kruse and Frazier, 1988). Kake hunters travel an average of 28 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include roads, or clearcuts of any age and more likely to hunt in areas that include muskeg, old-growth forest, open beach, grassy meadow, or areas above tree line (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Kake households have ever used to hunt deer. Summarizing, the majority of Kake households hunt deer in Wildlife Analysis Areas (WAA's) 3939, and 3940. These WAA's are the most successful areas in terms of number of deer hunted with 72 deer for 3939 and 26 deer for 3940 (ADF&G, 1989). These WAA's are virtually roadless (Appendix K). As displayed on the Subsistence map, these areas are moderately close to the community. Portions of these areas are also recreation places.

Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 52 percent of the total edible pounds of subsistence resources harvested by Kake households (Kruse and Frazier, 1988).

Figure 3-93 displays the abundance, distribution and competition for deer in all the WAA's where Kake hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Kake hunters will be met in each alternative for the next 50 years. Deer accounts for 24 percent of the total edible pounds of subsistence resources harvested by Kake households (Kruse and Frazier, 1988).

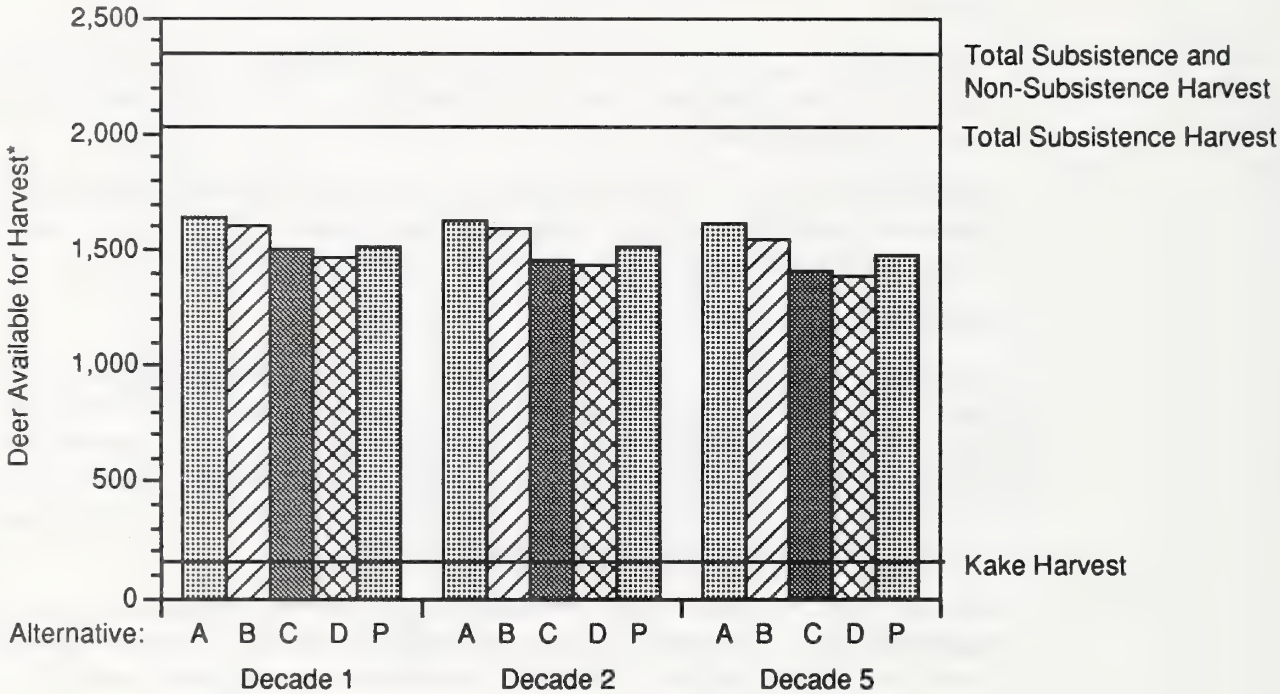
The predicted need for deer for subsistence hunters other than Kake and for non-subsistence hunters cannot be met at 10 percent of the habitat capability in any alternative for WAA's successfully hunted by Kake. However, at 20 percent of the habitat capability, the predicted need for deer for all hunters can be met for the next 50 years.

Considering all WAA's ever hunted by Kake households, the predicted need for deer can be met for all hunters at 10 percent of the habitat capability for the next 50 years.

WAA's where the majority of Kake households hunt deer (3939, 3940) are also the areas where they were most successful. These WAA's are allocated primarily to land use designations that do not allow timber harvesting.

Figure 3-93

Deer Availability and Anticipated Harvest in Areas Used by Kake Households *



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

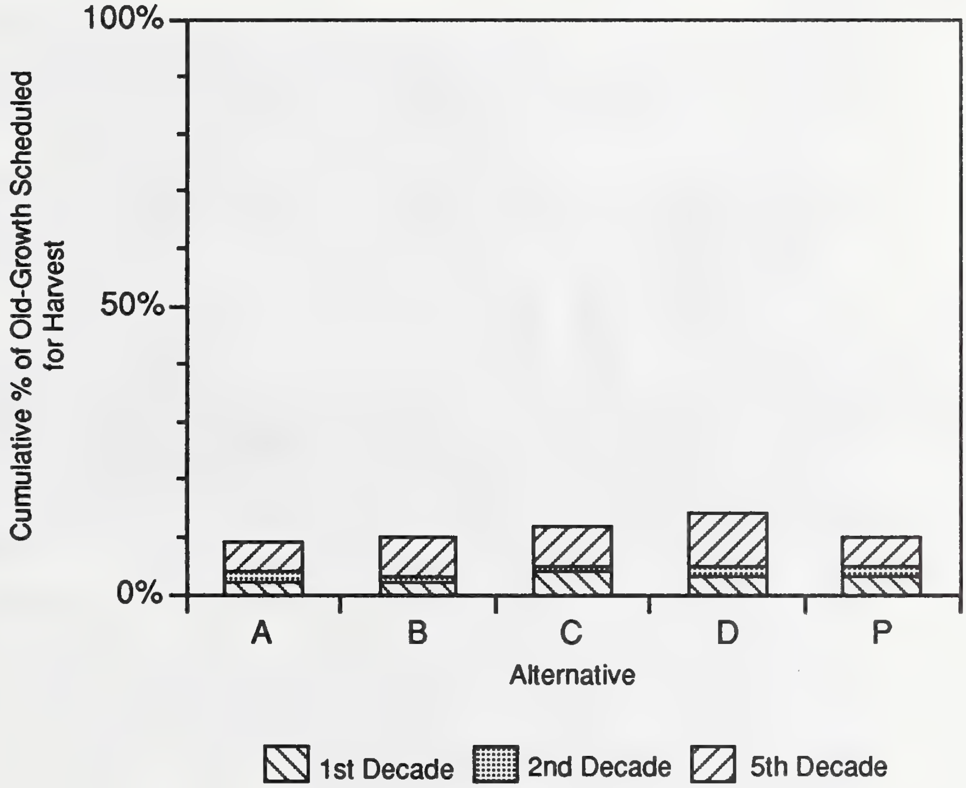
*This analysis was conducted only for those WAA's from which community residents actually harvested deer (9 WAA's). Analysis does not include those WAA's (40 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-94 shows that no more than 14 percent of the existing old-growth in WAA's ever hunted by Kake households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Kake are allocated to natural setting land use designations in Alternatives A and B and to land use designations that do allow timber harvesting in alternatives C, D, and P.

Figure 3-94

Cumulative Percent of Old-Growth Scheduled for Harvest in Areas Ever Hunted by Kake Households



Sources: 1988 Tongass Resource Use Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Kasaan

The eastern side of Prince of Wales Island is the location of Kasaan. Forty-three percent of its population of 40 is Alaska Native.

The Haida village of Kasaan was settled at its present site around 1900. The original village had been located seven miles from this site. A sawmill and school were built in 1892, with a post office being built in 1900. Canneries were the major industry, operating intermittently from 1901 to 1953.

Economy

TRUCS (2/89) lists the following economic sectors for Kasaan: fisheries, educational services, and local government. Employment in the fishing and school sectors are highly seasonal. The average yearly per capita income is $8,900 (TRUCS, 2/89).

Opinions

A number of Kasaan residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Kasaan residents expressed a desire to reduce the current timber sale program and requested emphasis on access for mineral exploration and development. They favored a road connection to Thorne Bay and other communities.

Subsistence and Recreation Use

Based on edible pounds harvested, invertebrates at 40 percent, deer at 22 percent and salmon and finfish other than salmon at 17 percent are the most important subsistence resources for Kasaan households (Kruse and Frazier, 1988). Kasaan hunters travel an average of seven miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include roads, clearcuts of any age, grassy meadow, open beaches, or areas above tree line and more likely to hunt in areas that include old-growth forest, or muskeg (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Kasaan households have ever used to hunt deer. Summarizing, the majority of Kake households hunt deer in 12 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1315, 1316, and 1317 are most heavily used. These WAA's are 58, 1 and 33 percent accessible via existing roads (Appendix K). As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. There were no deer reported as being harvest by Kasaan residents in 1989 (ADF&G, 1989).

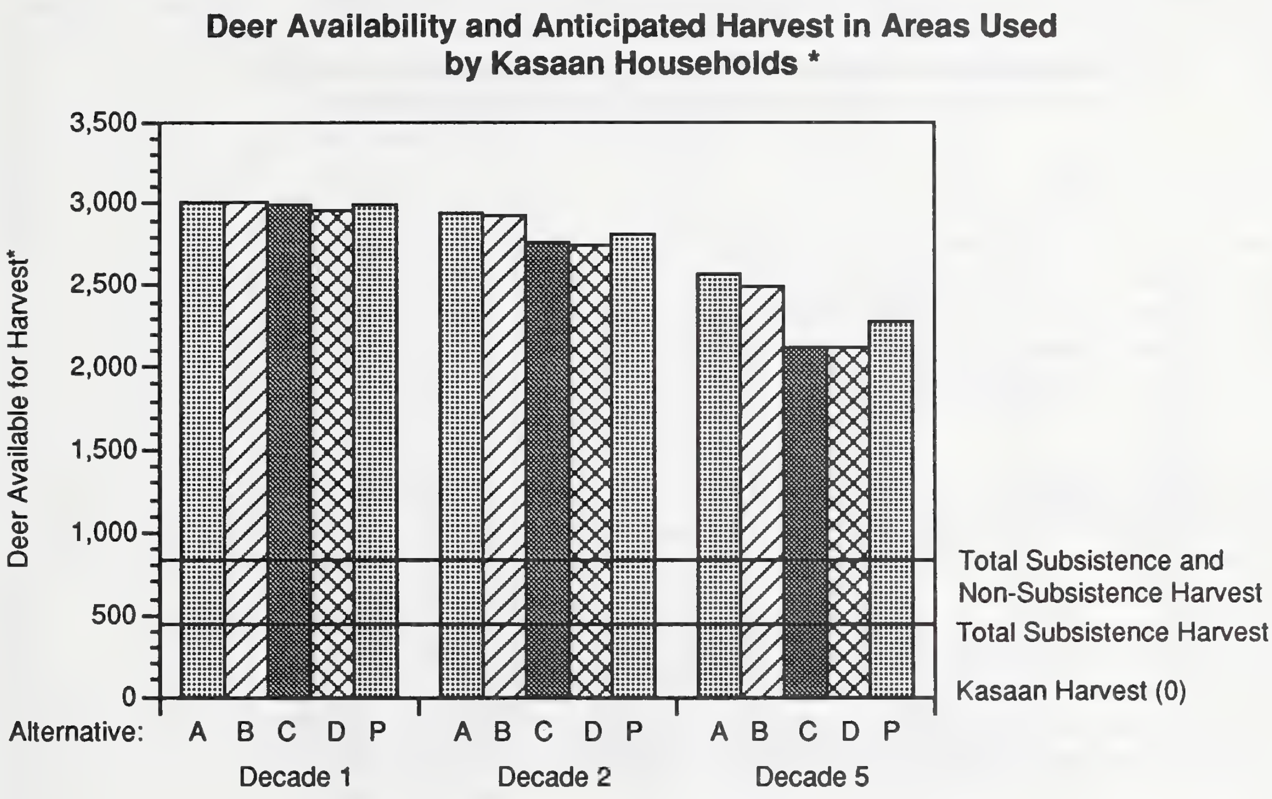
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 74 percent of the total edible pounds of subsistence resources harvested by Kasaan households (Kruse and Frazier, 1988).

Figure 3-95 displays the abundance, distribution and competition for deer only for the WAA's where Kasaan hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 22 percent of the total edible pounds of subsistence resources harvested by Kasaan households (Kruse and Frazier, 1988).

With one exception, WAA's where the majority of Kasaan households hunt deer (1315, 1316, 1317) are allocated primarily to land use designations that allow timber harvesting. The majority of WAA 1316 is allocated to land use designations that do not allow timber harvesting. According to Alaska Department of Fish and Game's 1989 Deer Hunter Survey Statistics, no deer were reported harvested by Kasaan residents.

Figure 3-95



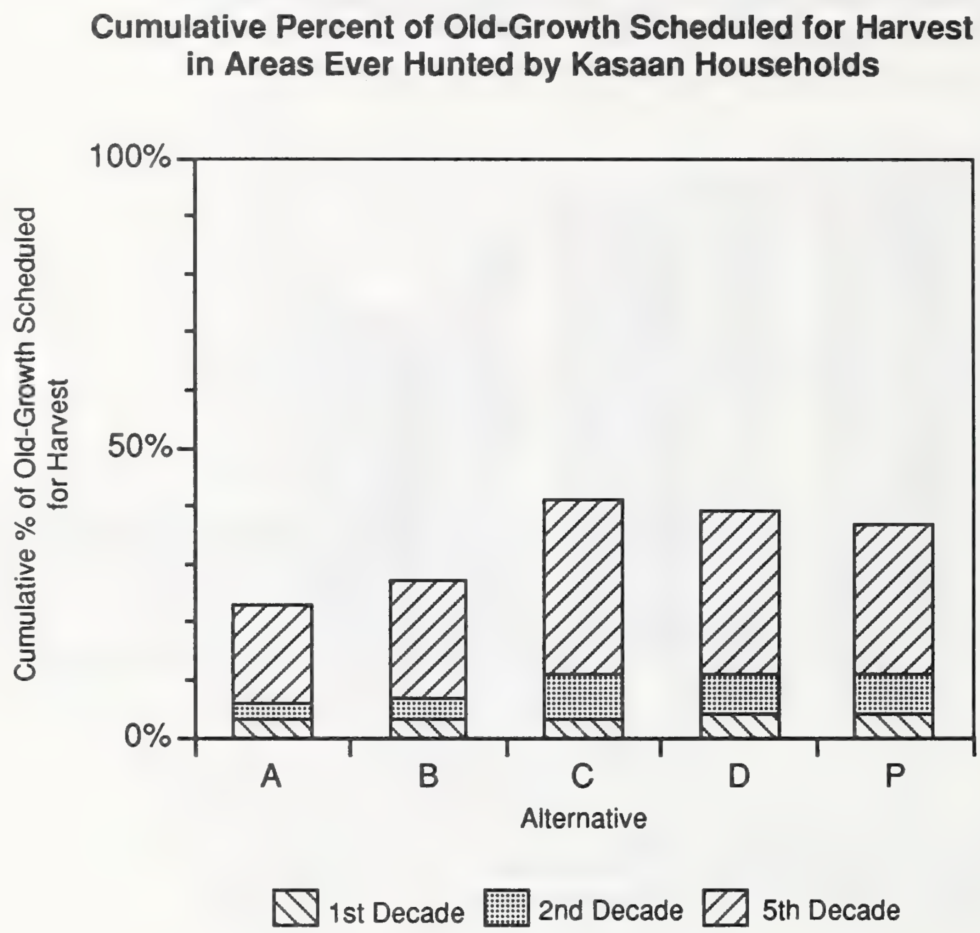
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's where community residents have ever hunted deer (12 WAA's). According to ADF&G 1989 Deer Hunter Survey Statistics, no deer were reported harvested by Kasaan residents. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-96 shows that no more than 41 percent of the existing old-growth in WAA's ever hunted by Kasaan households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Kasaan are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative P; and, Timber Production in Alternatives C and D.

Figure 3-96



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2. Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Ketchikan

Revillagigedo Island is the location of Ketchikan. Ketchikan and vicinity include Ketchikan, Saxman, Mountain Point, Clover Pass, Ward Cove, and Herring Cove which are located on the Ketchikan road system, and Pennock Island. The population of Ketchikan and vicinity is 12,705. Native populations vary from a high of 71 percent in Saxman to a low of less than 8 percent in the Ketchikan suburbs. Ketchikan itself has a native population of 15 percent.

The Ketchikan area was a summer fishing camp for the Tlingit Indians. Development began with a saltery at the mouth of Ketchikan Creek. Ketchikan was a boom town in the late 1800's. Since the early 1900's, timber products have been an important economic influence in Ketchikan. In 1954, a world-scale pulp mill was built in Ward Cove. Due to its location as a transportation center, fishing center, and focus for the subregion's timber industry, Ketchikan grew rapidly in the 1950's. Recently, mining has grown in economic importance, along with government, tourism, and services.

Economy

ADF&G Community Profiles (1987) listed the following sectors for Ketchikan's economy: Crafts, operators and laborers, professional and technical, service, clerical, sales, agricultural and forestry. Employment in the fishing industry tends to be seasonal. The economy, in general, is diverse enough to provide stability in the professional, technical, and service sectors. Average per capita income information was not available for Ketchikan.

Opinions

A number of Ketchikan residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Individual respondents to the issues expressed an interest in being able to harvest timber along Alaska Marine Highway routes, roads, and streams, and around their community. However, Ketchikan Chamber of Commerce recommended that some areas be cut progressively at a moderate rate rather than heavily at a rapid rate to maintain scenic quality and to display a multiple-use forest.

Ketchikan State Parks Advisory Board recommended additional road access to recreation areas and the Chamber recommended developed recreation sites. Ketchikan residents who responded to the issues were satisfied with the current management emphasis on recreation.

Individual respondents requested that greater emphasis be placed on fish, and maintenance of old-growth habitat near their community for wildlife. The Chamber of Commerce indicated that the current management emphasis for wildlife and timber harvesting is adequate. Individuals who responded to the issues along with the Chamber agree that current management emphasis on subsistence is adequate and that timber harvest and road construction have a positive effect on subsistence opportunities. Both want the current timber sale program and the long-term contracts to continue.

Individuals who responded to the issues do not want additional roads, log transfer facilities, nor do they want to be connected to other existing roads. However, the Chamber of Commerce and the State Parks Advisory Board favor additional roads and want alternatives considered that connect Southeast Alaska to Canada. Ketchikan respondents are split in their opinion regarding mineral exploration and development with half wanting more emphasis and half satisfied with the current level. The Chamber supports the idea of maintaining the current mix of emphasis.

Individual Ketchikan respondents want less Wilderness as does the Chamber. Ketchikan State Parks Advisory Board recommended that portions of existing Wilderness be made available for timber harvest in exchange for other Wilderness-like areas. The Chamber supports additional emphasis on timber and mining. However, the State Parks Advisory Board wants emphasis on tourism, wildlife, recreation and subsistence. Individuals commented that a balanced combination of timber, mining and other commodity industries with tourism, recreation and fishing would be most desirable.

Those offering oral testimony expressed considerable differences of opinion. The Ketchikan Chamber of Commerce, Alaska Women in Timber, Kluckwan Forest Products and Southeast Stevedoring pointed out the importance of the timber industry to the economy of Southeast Alaska. They want a higher allowable sale quantity than currently exists and believe that roads created for logging can provide more recreation opportunities. The Tongass Conservation Society does not want high-volume old-growth harvested particularly on Cleveland Peninsula, Honker Divide, Salmon Bay and Orchard Lake and Creek.

Hunting and Recreation Use

Ketchikan is not a subsistence community, consequently, there is no information about the areas Ketchikan households have ever gone to to hunt deer. However, Appendix K provides detailed information about the areas that Ketchikan residents have successfully hunted deer. Summarizing, the majority of Ketchikan residents successfully hunted deer in 48 Wildlife Analysis Areas (WAA's). Based on the number of deer harvested, WAA's 101 with 101 deer, 1211 with 116 deer and 1422 with 116 deer are the most productive (ADF&G, 1989). These areas are 3, 21 and 58 percent accessible via existing roads (Appendix K). As displayed on the Subsistence map, WAA 101 is quite close to the community while the other areas some distance away.

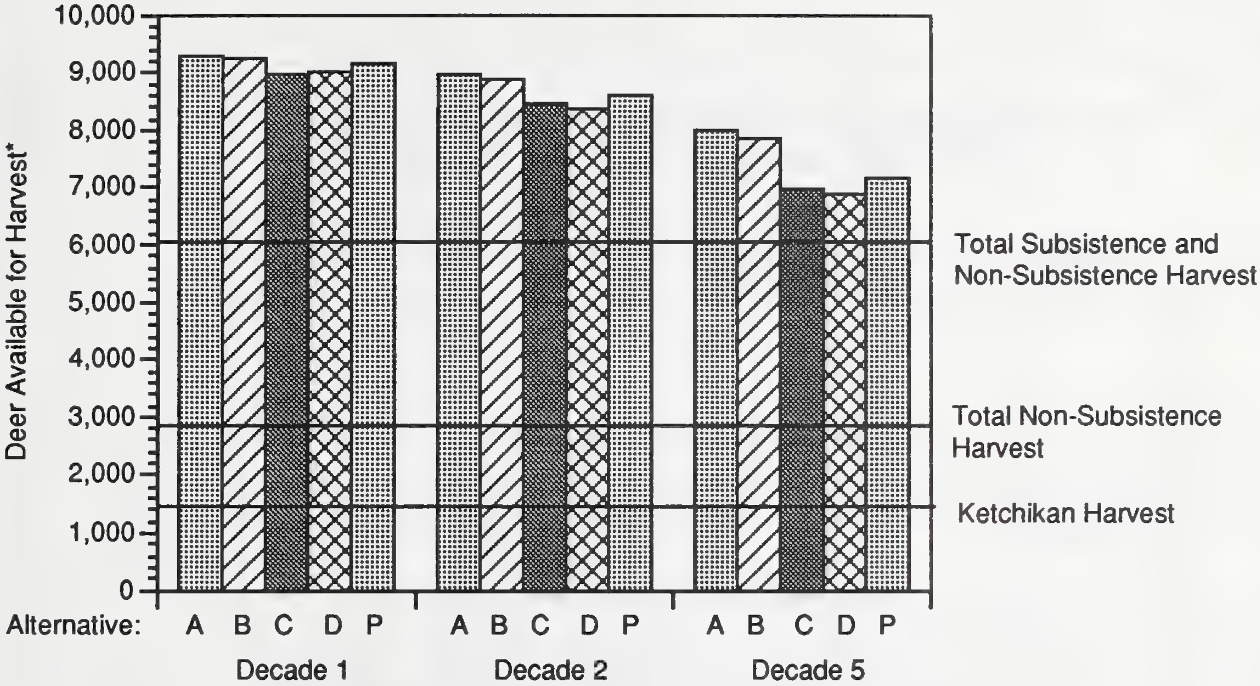
Direct, Indirect and Cumulative Effects

Figure 3-97 displays the abundance, distribution and competition for deer only for the WAA's where Ketchikan hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years.

With exception of WAA 101, WAA's where Ketchikan hunters most successfully harvested deer (101, 1211, 1422) are allocated primarily to land use designations that allow timber harvesting.

Figure 3-97

Deer Availability and Anticipated Harvest in Areas Used by Ketchikan Households *



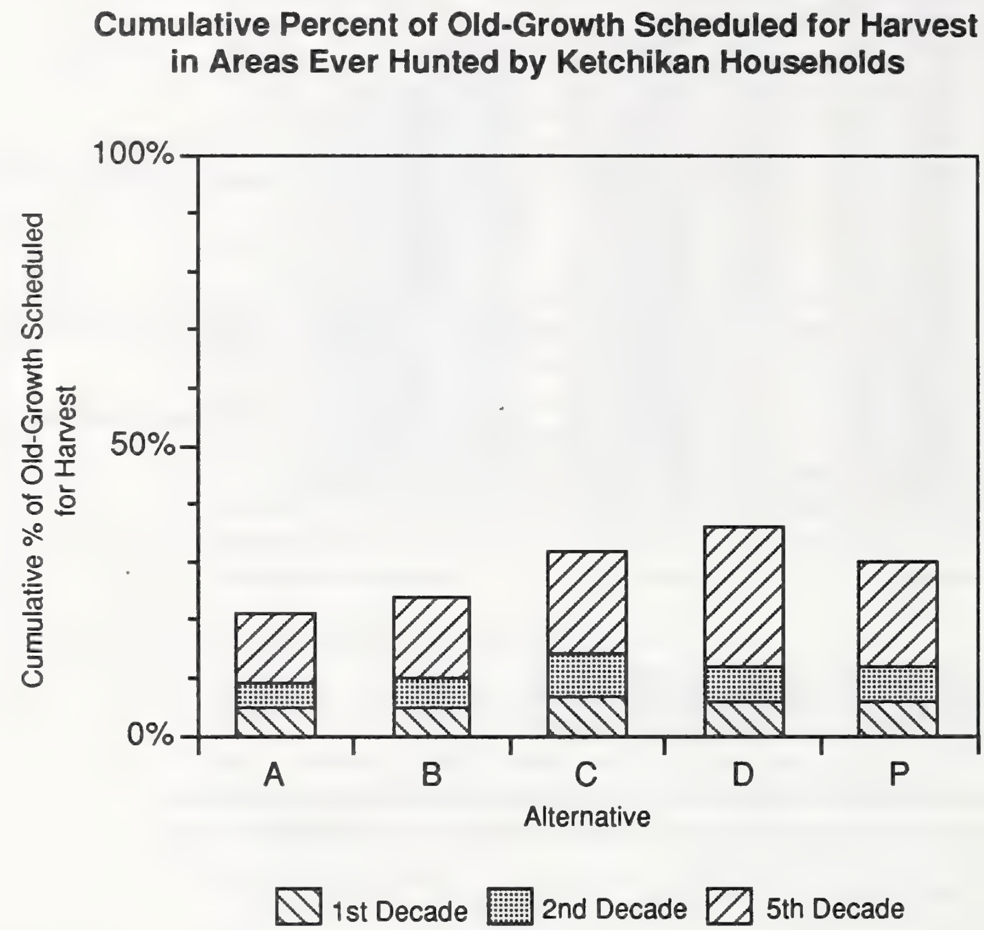
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's where community residents actually harvested deer (48 WAA's). Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-98 shows that no more than 32 percent of the existing old-growth in WAA's ever hunted by Ketchikan households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Ketchikan are allocated to natural setting land use designations in all alternatives.

Figure 3-98



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Klawock

Prince of Wales Island is the location of Klawock. Forty-five percent of the population of 795 is Alaska Native.

Tlingit Indians have lived in the same area, near the Klawock River for at least 600 years. Present-day growth and development of Klawock began with commercial fisheries, and with the first salmon saltery in Southeast Alaska. Two additional canneries were built in 1920 and 1924 along with an associated sawmill. One cannery continues to operate in Klawock. In 1971, a major sawmill was constructed that operated sporadically. With harvest of Native corporation lands in the vicinity of Klawock, Klawock-Heenya, the ANCSA village corporation, constructed docking and log transfer facilities near the city. Klawock is now the center of the Tlingit population on West Prince of Wales Island.

Economy

TRUCS (2/89) found that retail trade, educational services, forestry and fishing were the major economic sectors of Klawock. Employment is highly seasonal in all these sectors. Klawock's average per capita yearly income is $8,500 (TRUCS, 2/89).

Opinions

A number of Klawock residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Klawock respondents to the issues indicated a desire to see more emphasis placed on managing for scenic resources, recreation, and wildlife. The Klawock Cooperative Association recommended that additional management emphasis be placed on subsistence. Individual repondents and the Association want the current timber sale program reduced and the long-term contracts terminated. Individuals want a balance between timber, mining, tourism, recreation and fishing.

Those offering oral testimony expressed considerable different opinions. Some individuals want the current timber sale program increased both for jobs and the continued viability of small business. The Klawock Cooperative Association indicated that a timber sale program of more than 400 million board feet would be bad for subsistence. Of special concern are roads which increase competition for deer. Klawock Tribal Elders are opposed to any timber harvesting on Prince of Wales Island stating that the land belongs to the Klawock Tlingit people. The Alaska Native Brotherhood does not want log transfer sites built at Kelly Cove, Nail Point or Cape Elika.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 32 percent, finfish other than salmon at 29 percent and deer at 19 percent are the most important subsistence resources for Klawock households (Kruse and Frazier, 1988). Klawock hunters travel an average of 35 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include open beach, areas above tree line, or older clearcuts and more likely to hunt in areas that include muskeg, old-growth forest, roads, young or middle-aged clearcuts, or grassy meadows (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Klawock households have ever used to hunt deer. Summarizing, the majority of Klawock households hunt deer in five Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1420, 1421, and 1422 are most heavily used. These WAA's are 53, 44 and 58 percent accessible via existing roads (Appendix K). As displayed on the Subsistence map, these areas are moderately

close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 1318 (113 deer), 1422 (28 deer) and 1529 (28 deer) (ADF&G, 1989). These WAA's are 15, 58 and 58 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

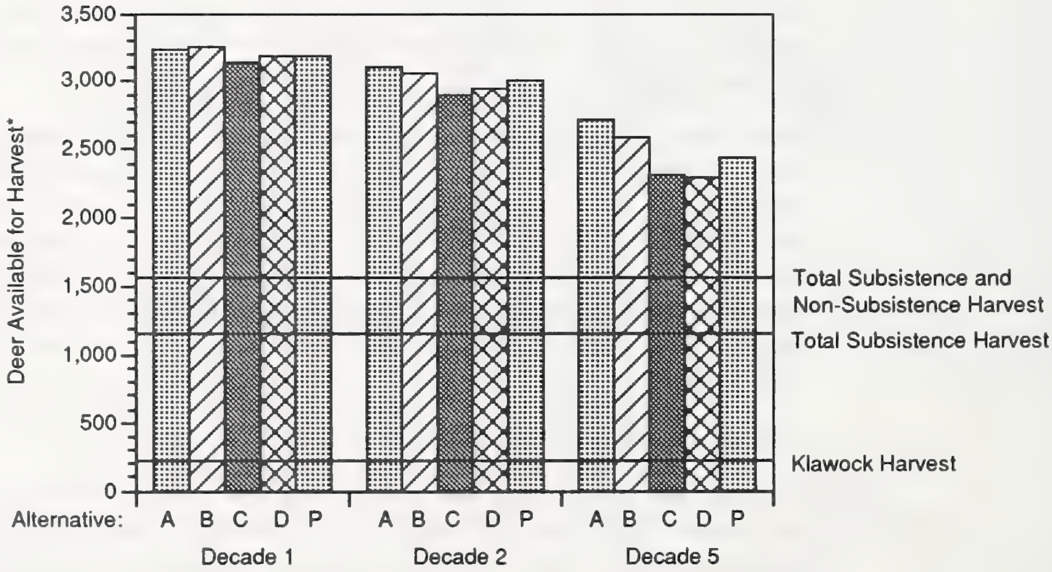
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 75 percent of the total edible pounds of subsistence resources harvested by Klawock households (Kruse and Frazier, 1988).

Figure 3-99 displays the abundance, distribution and competition for deer only for the WAA's where Klawock hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 19 percent of the total edible pounds of subsistence resources harvested by Klawock households (Kruse and Frazier, 1988).

WAA's where the majority of Klawock households hunt deer (1420, 1421, 1422) and are most successful (1318, 1422, 1529) are allocated primarily to land use designations that allow timber harvesting.

Figure 3-99

Deer Availability and Anticipated Harvest in Areas Used by Klawock Households *



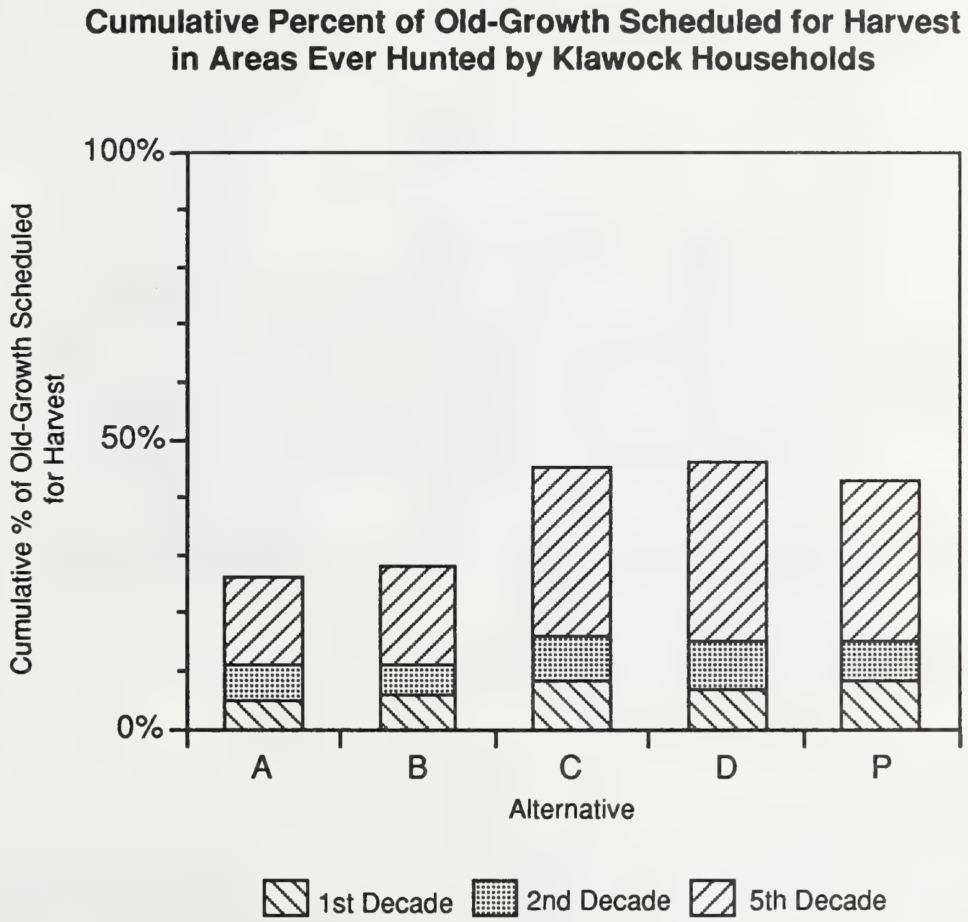
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (10 WAA's). Analysis does not include those WAA's (33 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-100 shows that between five percent (Alternative A, first decade) and 39 percent (Alternative D, fifth decade) of the existing old-growth in WAA's ever hunted by Klawock households will be harvested.

The majority of recreation places near Klawock are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative P; and, Timber Production in Alternatives C and D.

Figure 3-100



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2. Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Klukwan

Located in northern Southeast Alaska, northwest of Haines on the Chilkat River, Klukwan has a population of 133. Alaska Natives comprise 82 percent of this population.

Because of its location in the Chilkat River Valley, Klukwan, a Chilkat Indian village, has had a long history as a trade center. With the Gold Rush of the late 1800's, the Chilkat Valley was used as a supply route to Dawson in the Yukon. Since then, little development has taken place. The Alaska Chilkat Bald Eagle Preserve was recently established adjacent to the community.

Economy

Klukwan's principal economic sectors include transportation, communications and utilities, and health and social services (TRUCS, 2/89). All employment is seasonal. The average per capita yearly income for Klukwan is $6,000, one of the lowest in Southeast Alaska.

Opinions

Klukwan residents did not comment on the planning issues nor was oral testimony on the 1990 DEIS provided.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 52 percent and finfish other than salmon at 34 percent are the most important subsistence resources for Klukwan households. Deer comprised only 5 percent of the total edible pounds harvested (Kruse and Frazier, 1988). Klukwan hunters travel an average of 46 miles to their most reliable deer hunting areas. They are less likely to hunt in areas above tree line or in areas that include roads, clearcuts of any age, or open beaches and more likely to hunt in areas that include muskeg, old-growth forest, or grassy meadows (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Klukwan households have ever used to hunt deer. Summarizing, the majority of Klukwan households hunt deer in 20 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1420, 2621, and 3312 are most heavily used. These WAA's are 53, 0 and 7 percent accessible via existing roads (Appendix K). As displayed on the Subsistence map, these areas are some distance from the community and portions of these areas are also recreation places. No deer were reported harvested by Klukwan residents in 1989 (ADF&G, 1989).

Direct, Indirect and Cumulative Effects

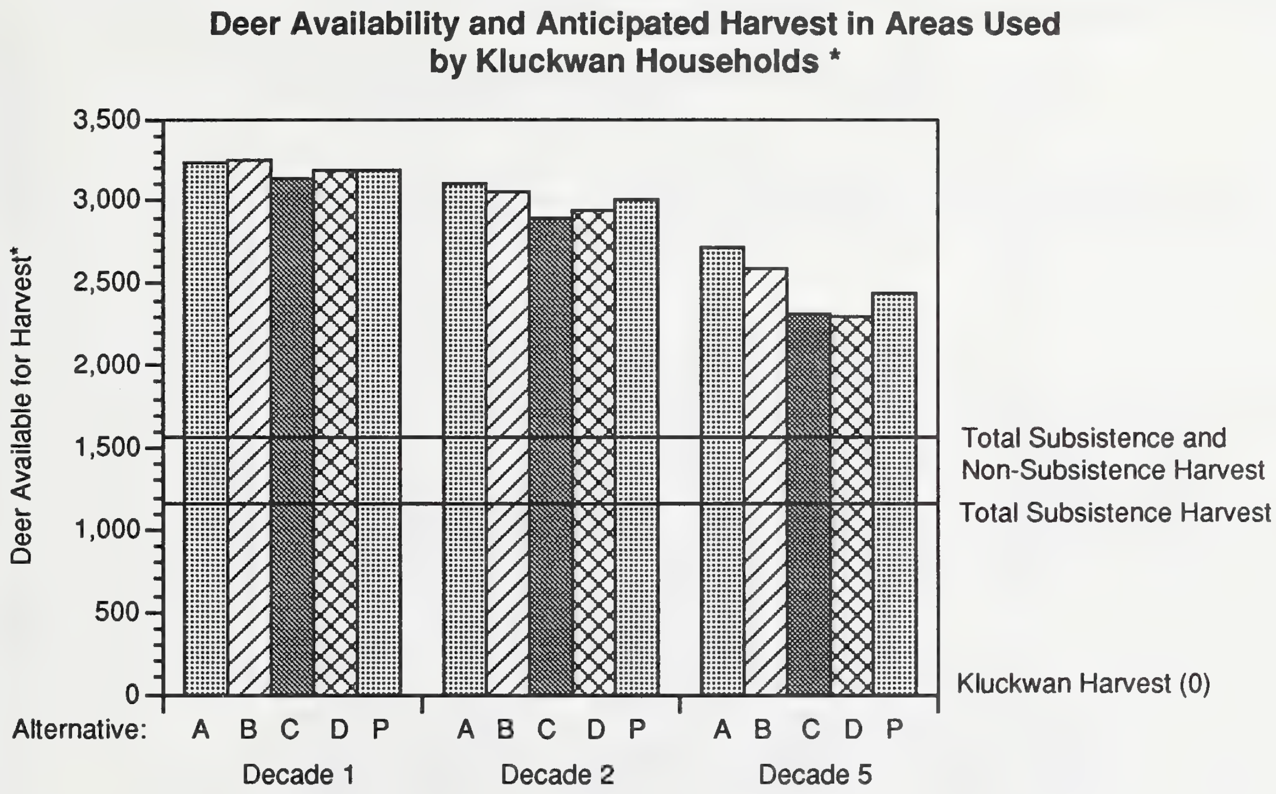
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 87 percent of the total edible pounds of subsistence resources harvested by Klukwan households (Kruse and Frazier, 1988).

Figure 3-101 displays the abundance, distribution and competition for deer for the WAA's ever hunted by Klukwan households. The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 5 percent of the total edible pounds of subsistence resources harvested by Klukwan households (Kruse and Frazier, 1988). According to Alaska Department of Fish and Game's 1989 Deer Hunter Survey, no deer were reported harvested by Klukwan residents.

The predicted need for deer for subsistence hunters other than Klukwan cannot be met at 10 percent of the habitat capability in Alternative C in the second decade or in Alternatives C, D and P in the fifth decade. However, at 20 percent of the habitat capability, the predicted need for deer for all subsistence and non-subsistence hunters can be met for the next 50 years.

With exception of WAA 2621, WAA's where the majority of Klukwan households hunt deer (1420, 2621, 3312) are allocated primarily to land use designations that allow timber harvesting. According to Alaska Department of Fish and Game's 1989 Deer Hunter Survey, no deer were reported harvested by Klukwan residents.

Figure 3-101



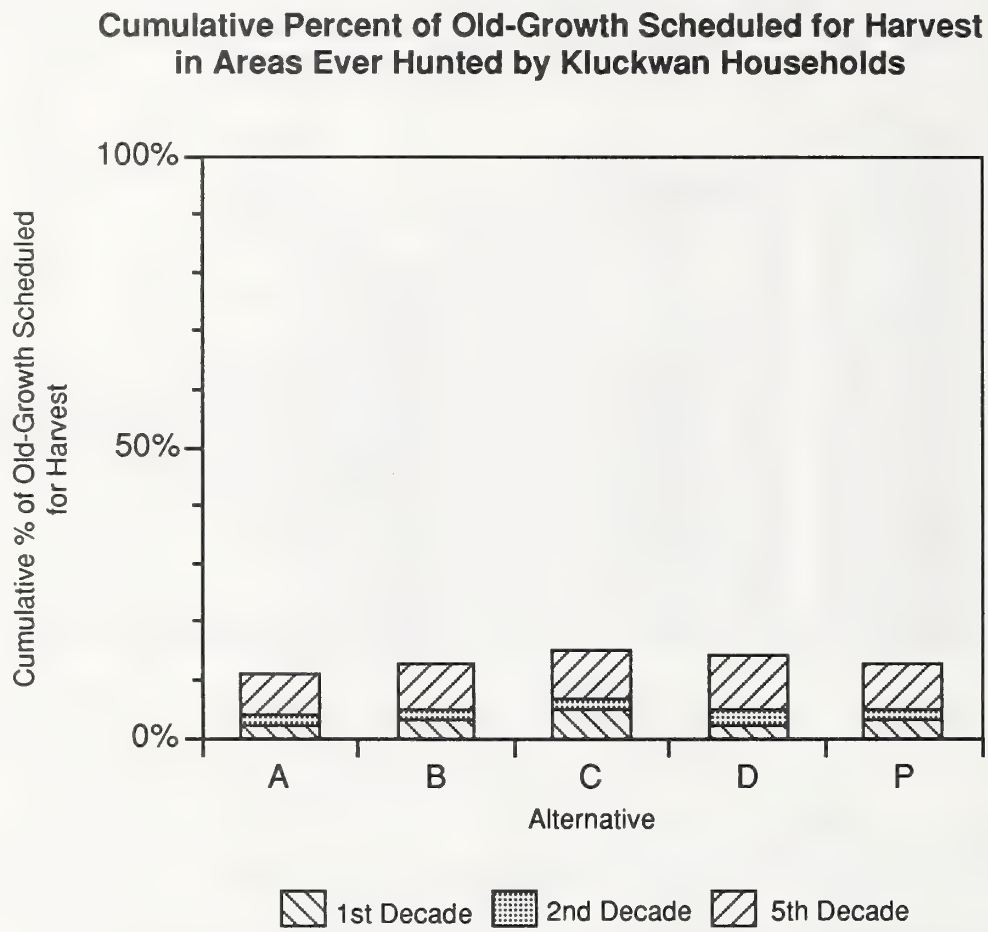
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's where community residents have ever hunted deer (19 WAA's). According to ADF&G 1989 Deer Hunter Survey Statistics, no deer were reported harvested by Kluckwan residents. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-102 shows that no more than 16 percent of the existing old-growth in WAA's ever hunted by Klukwan households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Klukwan are allocated to Wilderness or natural setting land use designations in all alternatives.

Figure 3-`102



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Metlakatla

Annette Island in southern Southeast Alaska is the location of Metlakatla. Seventy-three percent of the population of 554 is Alaska Native.

In 1887, a minister of the Church of England and his Tsimshian followers moved from British Columbia in search of religious freedom. They settled in Metlakatla. In 1891, Congress declared Annette Island an Indian Reservation. The community of Metlakatla has prospered largely due to its self-sufficient nature and successful involvement in the commercial fishing and timber industries. The island was used for a brief time as a Coast Guard base and a regional airport. Today, a sawmill, fish hatchery, and cannery provide a substantial economic base.

Economy

The same percentage of Metlakatla's population are employed in wood processing and fish processing industries. Commercial fishing and educational services are the other major economic sectors of Metlakatla's economy. Metlakatla's yearly per capita income is $8,600 (TRUCS, 2/89).

Opinions

Metlakatla residents provided oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

The Annette Natural Resources Center wants subsistence emphasized. Others indicated that both timber harvesting and subsistence are important to the community and can exist together. Concern about the impacts to small mills if harvest is reduced was expressed.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 29 percent, finfish other than salmon and invertebrates at 23 percent and deer at 15 percent are the most important subsistence resources for Angoon households (Kruse and Frazier, 1988). Metlakatla hunters travel an average of 12 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include clearcuts of any age, roads, or areas above tree line and more likely to hunt in areas that include muskeg, open beach, or old-growth forest (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Metlakatla households have ever used to hunt deer. Summarizing, the majority of Metlakatla households hunt deer in Wildlife Analysis Areas (WAA's) 1209, and 1210. These WAA's are virtually roadless (Appendix K). As displayed on the Subsistence map, these areas are moderately close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA 202 (22 deer) (ADF&G, 1989). This WAA is roadless (Appendix K).

Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 75 percent of the total edible pounds of subsistence resources harvested by Metlakatla households (Kruse and Frazier, 1988).

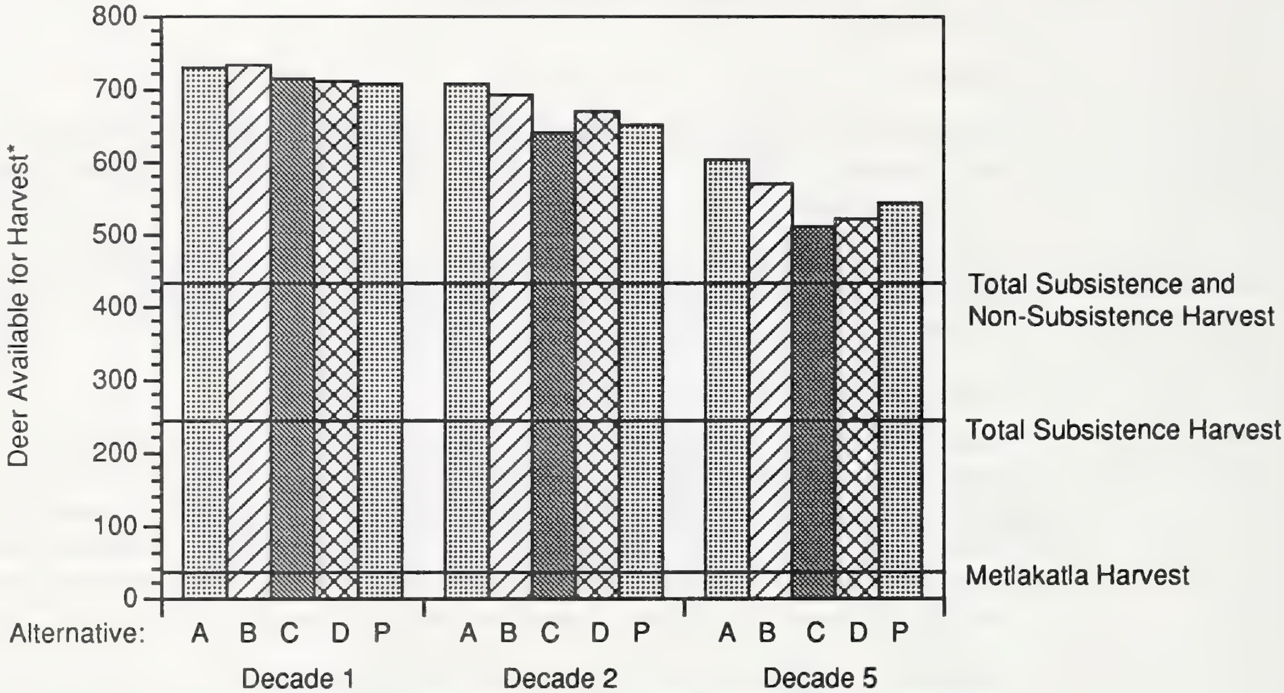
Figure 3-103 displays the abundance, distribution and competition for deer only for the WAA's where Metlakatla hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters,

will be met in each alternative for the next 50 years. Deer accounts for 15 percent of the total edible pounds of subsistence resources harvested by Metlakatla households (Kruse and Frazier, 1988).

WAA's where the majority of Metlakatla households hunt deer (1209, 1210) are allocated primarily to land use designations that allow timber harvesting. Exceptions are: Alternatives A, B and P for WAA 1209; and, Alternatives A and B for WAA 1210. The WAA where Metlakatla hunters most successfully harvested deer (202) in non-national forest land.

Figure 3-103

Deer Availability and Anticipated Harvest in Areas Used by Metlakatla Households *

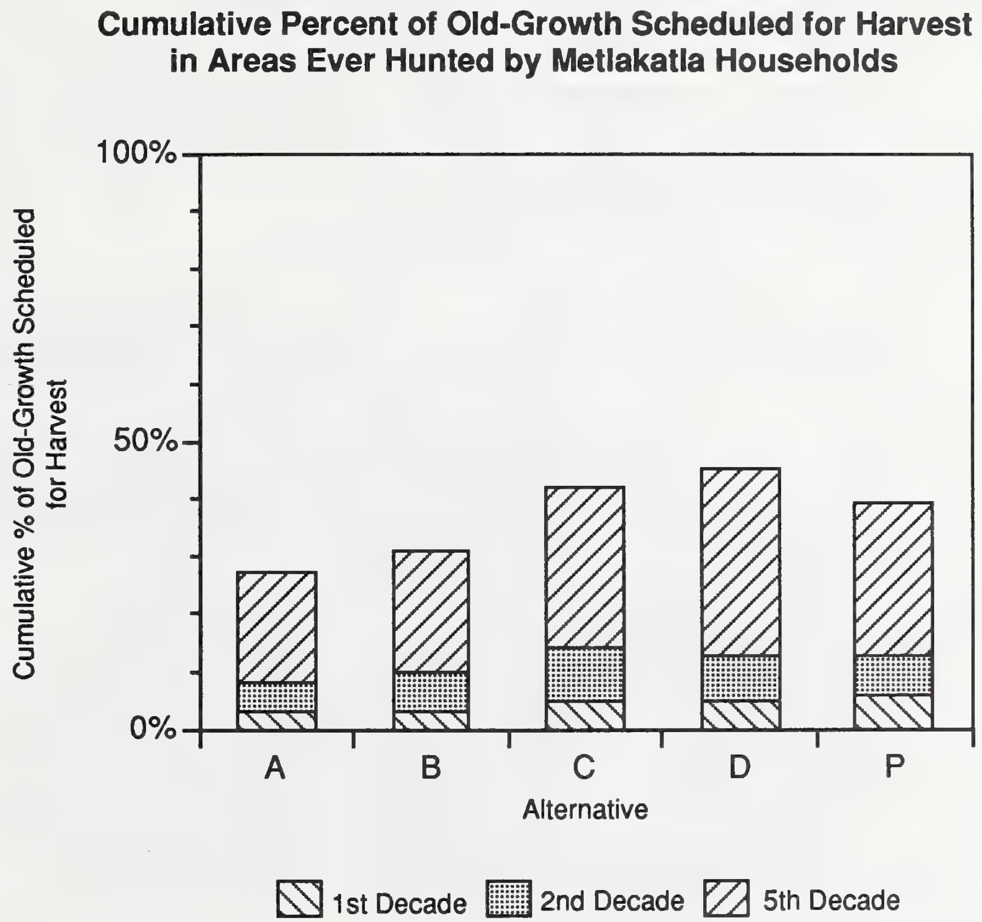


Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (5 WAA's). Analysis does not include those WAA's (25 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-104 shows that between three percent (Alternative A, first decade) and 45 percent (Alternative D, fifth decade) of the existing old-growth in WAA's ever hunted by Metlakatla households will be harvested over the next 50 years. The majority of recreation places near Metlakatla are allocated to natural setting land use designations in all alternatives.

Figure 3-104



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2. Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Meyers Chuck

Located 40 miles northwest of Ketchikan on Clarence Strait, on the tip of the Cleveland Peninsula is Meyer's Chuck, population 30. Three percent of the population is Alaska Native.

Beginning as a protected anchorage for fishing vessels, Meyers Chuck developed into a permanent community with the building of a cannery (turn of the century). Postal service began in 1922. Fishing and fish processing, and support services sustained the community until the mid-1900's. Low fish runs and World War II caused most of the population to move away. Recently, the population has begun to grow with fishers, retirees, and a few vacationers.

Economy

Education services is the main economic sector of Meyers' Chuck, followed by fisheries, transportation, communications, and utilities, and retail trade. All employment is highly seasonal. The average yearly per capita income of Meyer's Chuck is $4,000, one of the lowest in Southeast Alaska (TRUCS, 2/89).

Opinion

Meyers Chuck residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Meyers Chuck residents do not want roads connected to their community nor do they want logging within 3,000 feet of Meyers Chuck watershed. They want the Meyers Chuck peninsula and the Union Bay/Bear Creek valley to be a primitive recreation area and prefer that log transfer sites remain on the Behm Canal side of Cleveland Peninsula. Some do not want timber harvest to occur anywhere on Cleveland Peninsula.

Subsistence and Recreation Use

Based on edible pounds harvested, finfish other than salmon at 42 percent and salmon at 25 percent are the most important subsistence resources for Meyers Chuck households. Deer comprise only five percent of the total edible pounds harvested (Kruse and Frazier, 1988). Meyers Chuck hunters travel an average of 12 miles to their most reliable deer hunting areas. They are less likely to hunt in areas above tree line, or in areas that include clearcuts of any age, roads, or grassy meadows and more likely to hunt in areas that include muskeg, old-growth forest, or open beach (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Meyers Chuck households have ever used to hunt deer. Summarizing, the majority of Meyers Chuck households hunt deer in 26 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1003, 1315, and 1817 are most heavily used. These WAA's are 83, 58 and 0 percent accessible via existing roads (Appendix K). As displayed on the Subsistence map, two of the three areas are close to the community (1515, 1817) and portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA 614 (7 deer) (ADF&G, 1989). This WAA is roadless (Appendix K).

Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 80 percent of the total edible pounds of subsistence resources harvested by Meyers Chuck households (Kruse and Frazier, 1988).

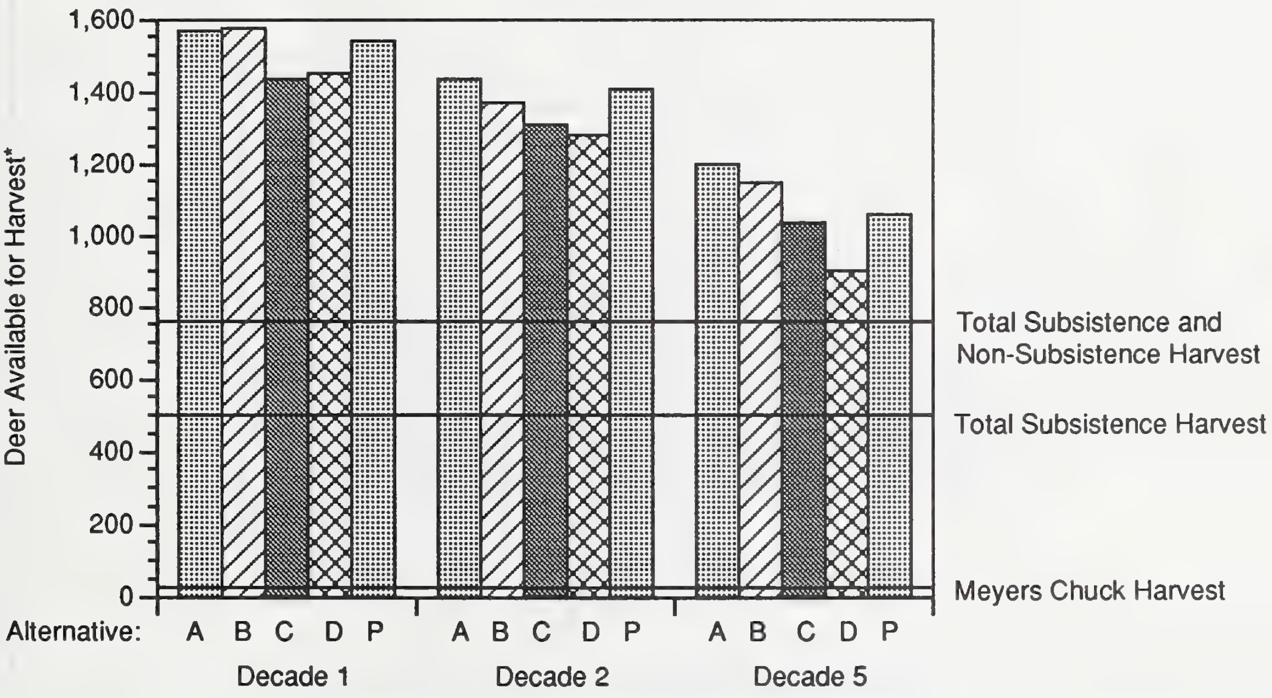
Figure 3-105 displays the abundance, distribution and competition for deer only for the WAA's where Meyers Chuck hunters successfully harvested deer. (This does not include every WAA

where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for five percent of the total edible pounds of subsistence resources harvested by Meyers Chuck households (Kruse and Frazier, 1988).

WAA's where the majority of Meyers Chuck households hunt deer (1003, 1315, 1817) and where they are most successful (614) are allocated primarily to land use designations that allow timber harvesting. Exceptions are: Alternatives A and B for WAA 1817; and, Alternatives A, B and D for WAA 614.

Figure 3-105

Deer Availability and Anticipated Harvest in Areas Used by Meyers Chuck Households *



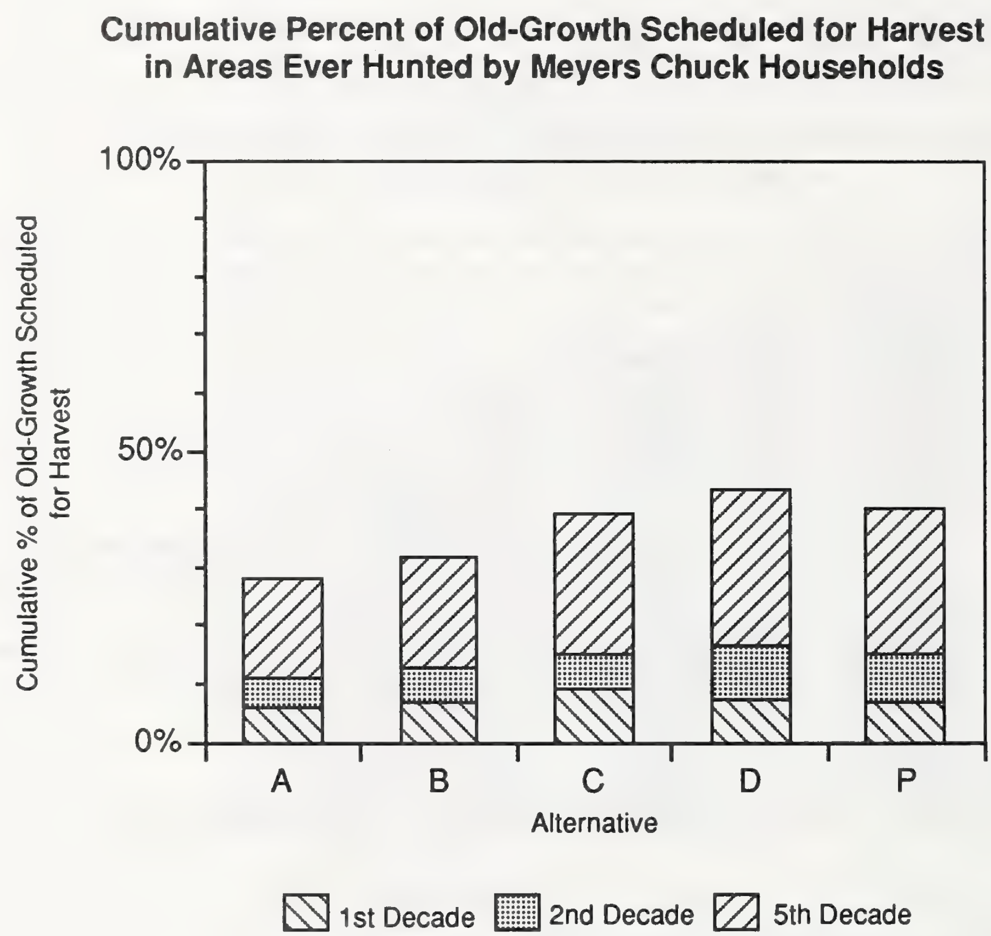
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (7 WAA's). Analysis does not include those WAA's (29 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-106 shows that between six percent (Alternative A, first decade) and 43 percent (Alternative D, fifth decade) of the existing old-growth in WAA's ever hunted by Meyers Chuck households will be harvested over the next 50 years.

The majority of recreation places near Meyers Chuck are allocated to natural setting land use designations in all alternatives.

Figure 3-106



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

North Whale Pass

North Whale Pass is located on northeast Prince of Wales Island. The population of 50 residents is five percent Alaska Native. Whale Pass is a former logging camp first established in 1956. In 1982 it was the site of a state land sale which resulted in recent community growth.

Economy

North Whale Pass is still economically dependent on the logging industry and is connected to several other Prince of Wales Island communities by the Island road system. The economy has diversified in recent years in the form of a fishing lodge, vacation homes and limited services. A state-owned float plane facility was built in the mid-1980's. The average annual income is $11,921 (TRUCS, 2/89).

Opinions

North Whale Pass residents did not respond to the planning issues.

Subsistence and Recreation Use

Based on edible pounds harvested, deer at 27 percent, salmon at 22 percent and finfish other than salmon at 20 percent are the most important subsistence resources for North Whale Pass households (Kruse and Frazier, 1988). North Whale Pass hunters travel an average of 10 miles to their most reliable deer hunting areas. They are less likely to hunt in open beaches, areas above tree line, or middle-aged clearcuts and more likely to hunt in areas that include old-growth forest, roads, muskeg, young or old clearcuts, or grassy meadows (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that North Whale Pass households have ever used to hunt deer. Summarizing, the majority of North Whale Pass households hunt deer in Wildlife Analysis Areas (WAA's) 1527, 1528, and 1530. These WAA's are 45, 15 and 54 percent accessible via existing roads (Appendix K). As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 1530 (31 deer), 1107 (13 deer) and 1318 (10 deer) (ADF&G, 1989). These WAA's are 55, 16 and 15 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

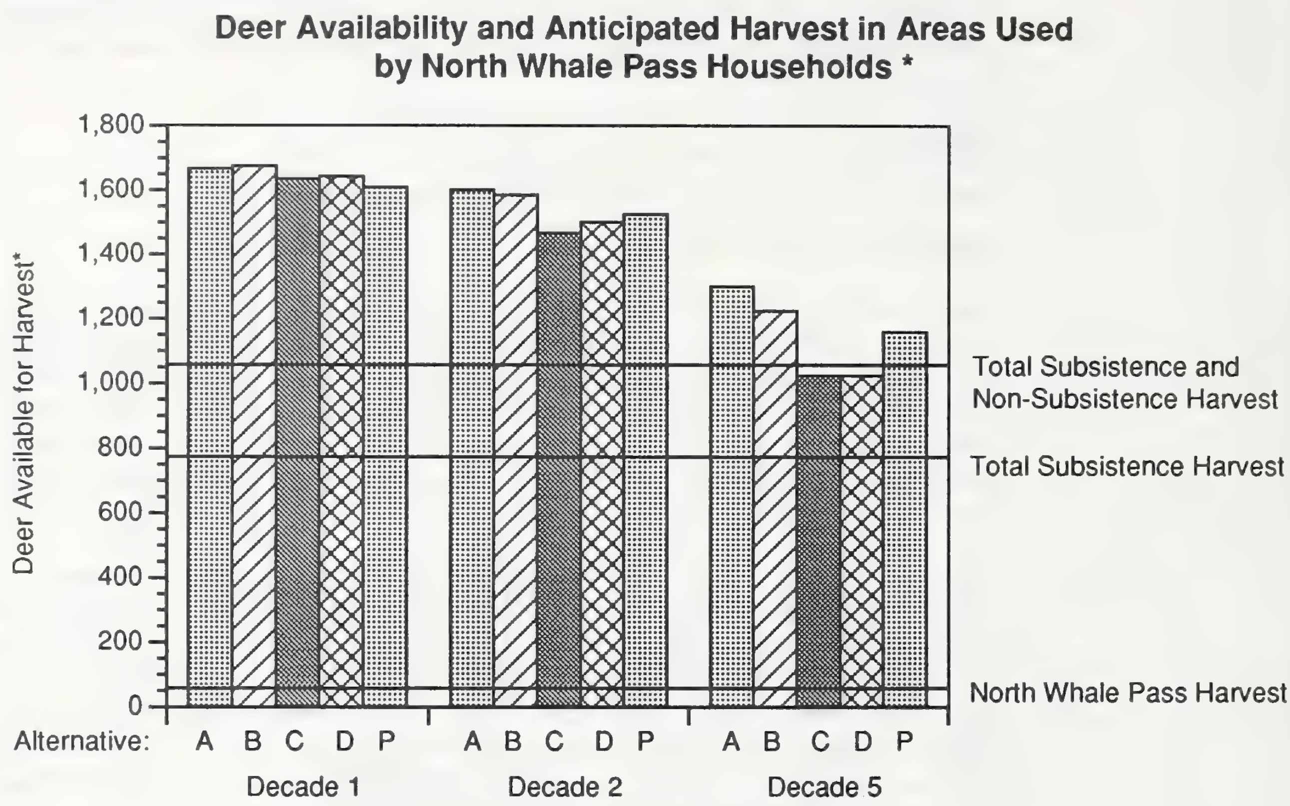
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 60 percent of the total edible pounds of subsistence resources harvested by North Whale Pass households (Kruse and Frazier, 1988).

Figure 3-107 displays the abundance, distribution and competition for deer only for the WAA's where North Whale Pass hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met for the next 50 years in all alternatives except C and D. These alternatives cannot meet non-subsistence needs for deer in the fifth decade. Deer accounts for 27 percent of the total edible pounds of subsistence resources harvested by North Whale Pass households (Kruse and Frazier, 1988).

The predicted need for deer for non-subsistence users cannot be met in Alternatives C and D at 10 percent of the habitat capability in those WAA's where North Whale Pass hunters have ever hunted deer. However, at 20 percent of habitat capability, predicted non-subsistence needs for deer can be met in all alternatives in all decades.

WAA's where the majority of North Whale Pass households hunt deer (1527, 1528, 1530) and where they are most successful (1107, 1318, 1530) are allocated primarily to land use designations that allow timber harvesting. Exceptions are: Alternatives A, B and P for WAA 1528 and Alternatives A, D and P for WAA 1107.

Figure 3-107



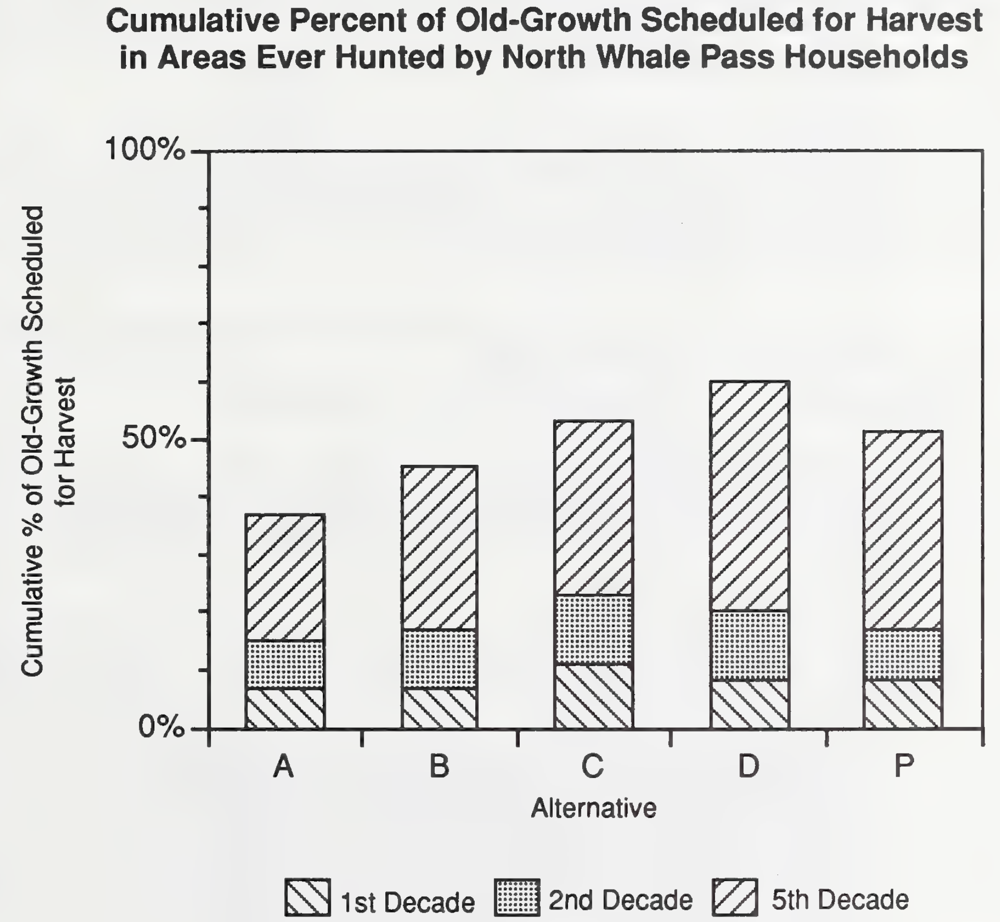
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (5 WAA's). Analysis does not include those WAA's (13 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-108 shows that between seven percent (Alternative A, first decade) and 58 percent (Alternative D, fifth decade) of the existing old-growth in WAA's ever hunted by North Whale Pass households will be harvested over the next 50 years.

The majority of recreation places near North Whale Pass are allocated to Scenic Viewshed or Modified Landscape land use designations in Alternatives A, C and P; and, Timber Production in Alternatives B and D.

Figure 3-108



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Pelican

Pelican is a fishing village along Lisianski Inlet on the northwest corner of Chichagof Island. Part of the community is built on pilings over the tideland. A boardwalk serves as the town's main thoroughfare. Pelican boasts a population of 243 with the Alaska Native component of the population at 27 percent.

It is believed that the west Chichagof area was used by Hoonah and Sitka Tlingit Indians for fishing camps and temporary villages. Settlement in Pelican probably began with mines and fox farms. Canneries began in the area to service the developing commercial fishing industry. Pelican was founded in 1938 by a fisherman who set up a fish buying operation and, eventually, a cold storage at the site. Following initial construction of the community, a school and post office were built. Growth since then has been slow, and linked entirely to the commercial fishing industry. A present-day cold storage provides employment. Some timber harvesting has also taken place in the Pelican area.

Economy

Fisheries and fish processing employ the majority of the population of Pelican. Educational services is the other economic sector. Although Pelican Cold Storage is a year-round employer, other employment in Pelican is highly seasonal. The average per capita income for Pelican is $11,000 (TRUCS, 2/89).

Pelican is not recognized under the Alaska Native Claims Settlement Act as a Native Village, therefore, it has little land base to expand.

Opinions

A number of Pelican residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Pelican residents who responded to the issues requested that additional emphasis be placed on scenic resources along the Alaska Marine Highway routes, roads, streams and around their community. These individuals also requested that more emphasis be placed on recreation, fish, wildlife, and subsistence. The City of Pelican wants the current timber sale program reduced and the long-term contracts terminated. The City does not want additional roads, log transfer facilities or to be connected to existing roads. However, Pelican respondents were split in their opinion regarding road development with half wanting a reduction in developments and half wanting a mix of road development with other Forest uses. Individual Pelican respondents favored maintaining current management emphasis for mineral exploration and development while the City opposed emphasizing mineral exploration and development. Individual respondents want management to emphasize tourism, wildlife, recreation and subsistence economic sectors. They do not want timber harvest in Hoonah Sound north of Lisianski Inlet.

Subsistence and Recreation Use

Based on edible pounds harvested, finfish other than salmon at 33 percent, deer at 30 percent and salmon at 17 percent are the most important subsistence resources for Pelican households (Kruse and Frazier, 1988). Pelican hunters travel an average of 10 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include clearcuts of any age, or roads and more likely to hunt in areas that include muskeg, old-growth forest, open beach, areas above tree line, or grassy meadows (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Pelican households have ever used to hunt deer. Summarizing, the majority of Pelican households hunt deer in six Wildlife

Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 3417, 3418, and 3419 are most heavily used. These WAA's are virtually roadless. As displayed on the Subsistence map, these areas are close to the community and a relatively large portion of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 3419 (97 deer) and 3418 (43 deer). These WAA's are virtually roadless (Appendix K).

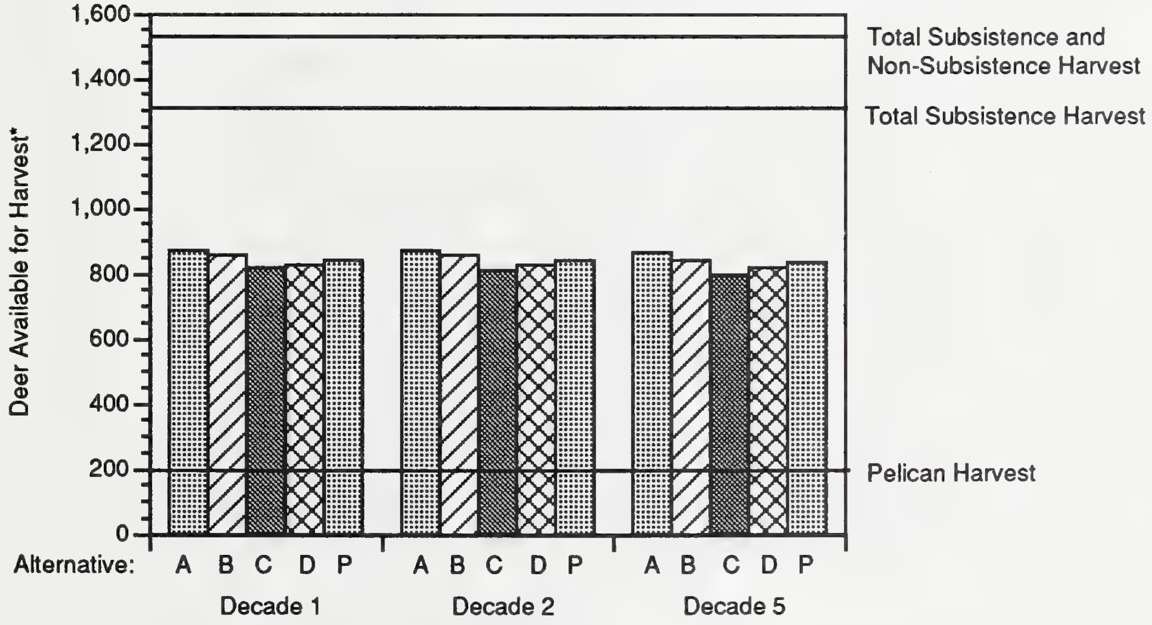
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 63 percent of the total edible pounds of subsistence resources harvested by Pelican households (Kruse and Frazier, 1988).

Figure 3-109 displays the abundance, distribution and competition for deer only for the WAA's where Pelican hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Pelican hunters will be met in each alternative for the next 50 years. Deer accounts for 30 percent of the total edible pounds of subsistence resources harvested by Pelican households (Kruse and Frazier, 1988).

Figure 3-109

Deer Availability and Anticipated Harvest in Areas Used by Pelican Households *



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (6 WAA's). Analysis does not include those WAA's (20 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

The predicted need for deer for subsistence users other than Pelican and for non-subsistence users cannot be met in any alternative at 10 percent of the habitat capability in those WAA's where Pelican hunters successfully harvested deer. Similarly, Figure 3-?? shows that, considering all the WAA's ever hunted by Pelican residents, only the predicted need for deer for Pelican residents can be met at 10 percent of the habitat capability. However, at 20 percent habitat capability, the predicted needs for deer for all hunters can be met for the next 50 years in all alternatives.

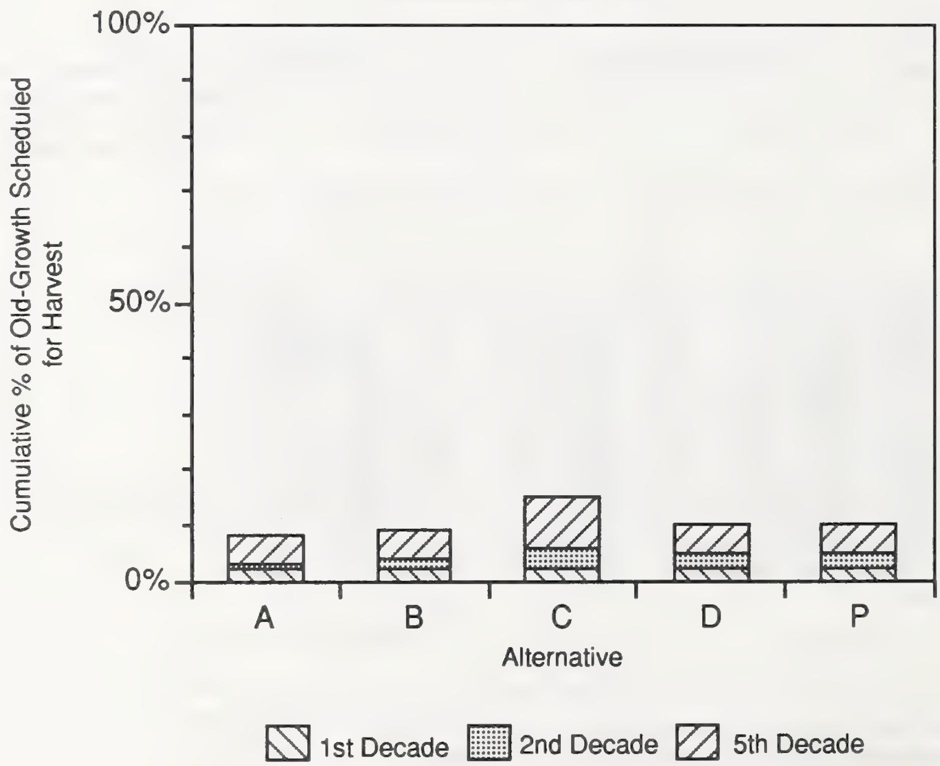
WAA's where the majority of Pelican households hunt deer (3417, 3418, 3419) are also the most successful. They are allocated primarily to land use designations that do not allow timber harvesting.

Figure 3-110 shows that no more than 15 percent of the existing old-growth in WAA's ever hunted by Pelican households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Pelican are allocated to Wilderness or natural setting land use designations in all alternatives.

Figure 3-110

Cumulative Percent of Old-Growth Scheduled for Harvest in Areas Ever Hunted by Pelican Households



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Petersburg and Vicinity

With a population of 4,149, Petersburg is located on the northern tip of Mitkof Island in east-central Southeast Alaska. Fourteen percent of Petersburg's population is Alaska Native. The community of Kupreanof is located less that one mile from Petersburg, across Wrangell Narrows on Kupreanof Island. This settlement is economically tied to Petersburg where most residents find employment, purchase goods, and attend school.

Founded by Norwegian, Peter Buschmann in 1899, Petersburg incorporated in 1906. More Norwegians followed and settled a Scandinavian-style community. Petersburg grew around a cannery, and the site quickly became a center for fishing, fish processing, and transportation. A sawmill was added, as were a packing house and docks. Continual growth has occurred in Petersburg through the years except for a slight decline in the 1950's. Today, Petersburg is an active community with fishing, fish processing, and timber being its predominant industries. Tourism has become an increasing source of revenue during the summer months.

Economy

Petersburg's main economic sector is seafood processing and manufacturing with the various governments being the second largest employer. Retail trade and construction make up the other economic sectors. Employment is seasonal in the manufacturing, retail, and construction sectors. No information was available on Petersburg's per capita incomes.

Opinions

A number of Petersburg residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Petersburg residents who responded to the issues want more emphasis on scenic resources, recreation, fish, and wildlife. Opinion was split on subsistence with half wanting more emphasis on subsistence and half wanting less. Those who responded requested that the current timber sale program continue along with the long-term timber sale contracts. Residents were split in their opinion of road development with half recommending a reduction in emphasis and half requesting a mix of road development with other Forest uses. Opinion was split three ways regarding mineral exploration and development. Some want more emphasis on mineral exploration and development, others want less, and still others want a mix. Respondents are satisfied with the current amount of designated Wilderness. They want management to emphasize the tourism, wildlife, recreation, and subsistence sectors of their economy.

Those offering oral testimony want more emphasis on subsistence, wildlife and tourism and less emphasis on timber. They want the long-term contracts terminated and do not want a road on the north side of Blind Slough. Others areas mentioned for protective management include Crystal Mountain, Sandhill Crane Lake, Raven's Roost and Dall Island.

Subsistence and Recreation Use

Appendix K provides detailed information about the areas that Petersburg households have ever used to hunt deer. Summarizing, the majority of Petersburg households hunt deer in 16 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 2007, 3939, and 3940 are most heavily used. These WAA's are 58, 0 and 5 percent accessible via existing roads (Appendix K). As displayed on the Subsistence map, WAA's 3939 and 3940 are some distance from the community and portions of all three areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 3939 (220 deer), 3315 (133 deer) and 3940 (110 deer) (ADF&G, 1989). These WAA's are 0, 11 and 5 percent accessible via existing roads (Appendix K).

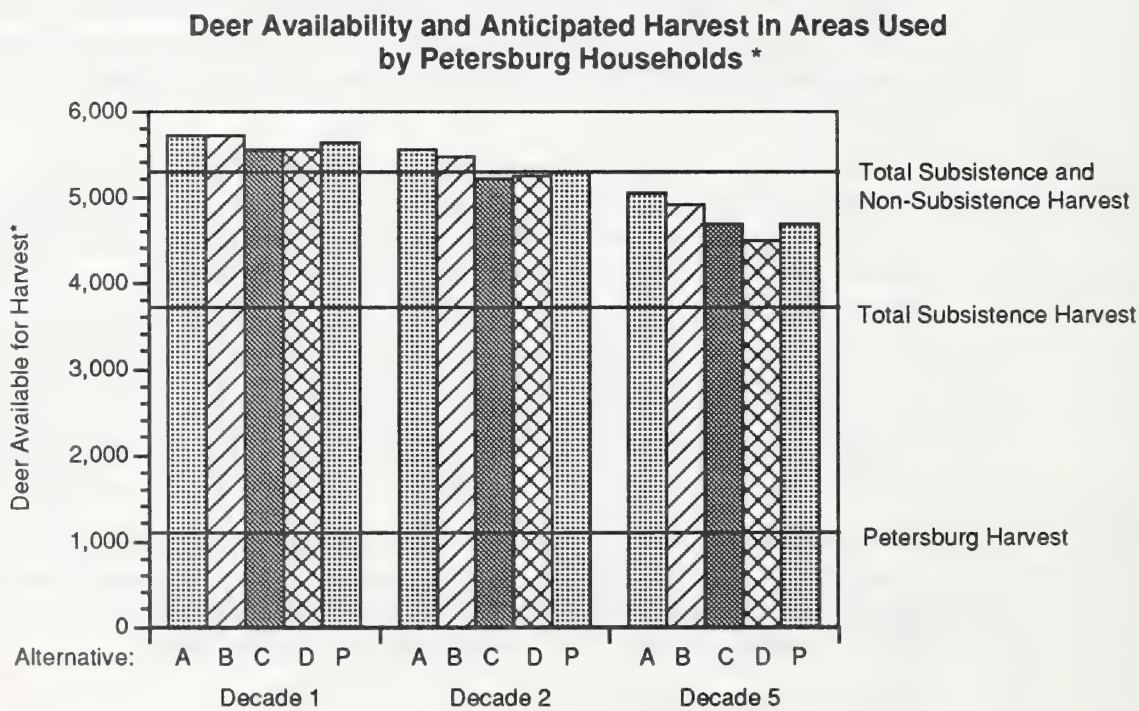
Direct, Indirect and Cumulative Effects

Figure 3-111 displays the abundance, distribution and competition for deer only for the WAA's where Petersburg hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for all subsistence hunters will be met in each alternative for the next 50 years. Deer accounts for 21 percent of the total edible pounds of subsistence resources harvested by Petersburg households (Kruse and Frazier, 1988).

The predicted need for deer for non-subsistence users cannot be met by Alternatives C, D or P in the second decade or by any alternative in the fifth decade at 10 percent of the habitat capability in those WAA's where Petersburg hunters successfully harvested deer. Figure 3-?? shows that, considering all the WAA's ever hunted by Petersburg residents, the predicted need for deer for non-subsistence users can be met in all alternatives at 10 percent of the habitat capability.

WAA's where the majority of Petersburg households hunt deer (2007, 3939, 3940) and where they are most successful (3315, 3939, 3940) are allocated primarily to land use designations that do not allow timber harvesting. Exceptions are WAA's 2007 and 3315.

Figure 3-111



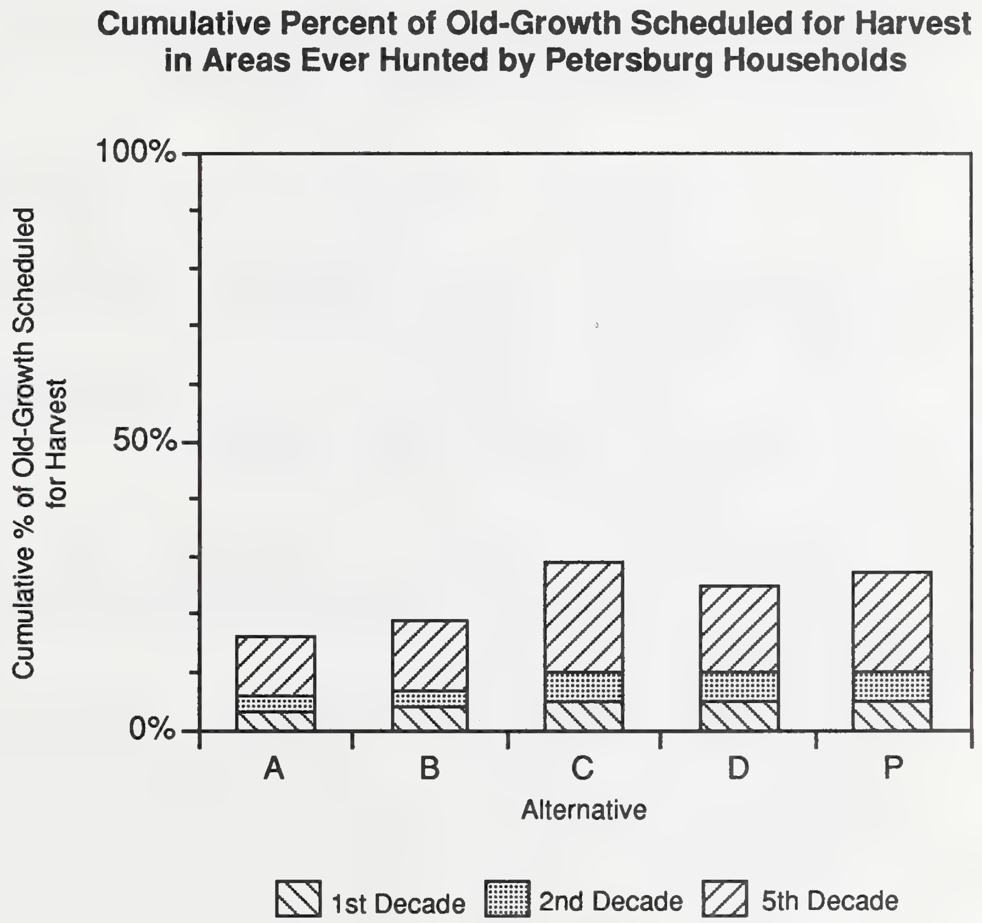
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (34 WAA's). Analysis does not include those WAA's (88 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-112 shows that no more than 25 percent of the existing old-growth in WAA's ever hunted by Petersburg households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Petersburg are allocated to Wilderness or natural setting land use designations in Alternatives A, B, D and P; and, Scenic Viewshed or Modified Landscape in Alternative C.

Figure 3-112



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Point Baker and Port Protection

Separated by 2 miles of water, these communities are located on the north tip of Prince of Wales Island. The combined population of both communities is 93 people, of which 7 percent are Alaska Native. Both communities are similar in history, economy, and use of local resources.

Captain George Vancouver, an early explorer, mapped and named this protected harbor in the late 1700's. The first floating fish packer came to Point Baker to buy fish in 1919 and trade continued until the 1930's. The actual community of Point Baker was not settled until the 1930's when the Forest Service opened the area for homesites.

Port Protection was founded by a man name Johnson when he took refuge in the cove after he had lost a wooden wheel off his boat. Johnson later built a store and a fuel dock and this area became a popular place for trollers to stop enroute to other destinations.

Economy

Both economies peak with summer and fall fishing. Most residents own fishing boats and choose to live here for the independent and subsistence lifestyle the area offers. The communities share a post office, store, and a fish and game advisory committee. They have been affected in recent years by logging activities in areas adjacent to them, and the development of a logging camp in nearby Labouchere Bay.

The main economic sector for Point Baker and Port Protection is fishing, followed by retail trade, construction, and education services. Employment is highly seasonal in all sectors. The per capita incomes for both communities is about $6,000 (TRUCS, 2/89).

Opinions

A number of Point Baker and Port Protection residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Community residents who responded to the issues want more emphasis on scenic resources, recreation, fish, wildlife, and subsistence. The Sumner Strait Fish and Game Advisory Committee would also like to see management emphasize wildlife and subsistence. Individual respondents and the Committee want the current timber sale program reduced, and the long-term contracts terminated. They do not want additional roads, log transfer facilities or connections to other existing roads. The Advisory Committee is opposed to emphasizing mineral exploration and development and favors additional Wilderness designations as do community residents. Both groups believe a balanced combination of timber, mining, tourism, recreation and fishing would be most desirable for the economy.

Subsistence and Recreation Use

Based on edible pounds harvested, deer at 27 percent, salmon at 26 percent and finfish other than salmon at 19 percent are the most important subsistence resources for Point Baker households (Kruse and Frazier, 1988). For Port Protection, salmon at 36 percent, finfish other than salmon at 29 percent, and deer at 13 percent are the most important subsistence resources based on edible pounds harvested (Kruse and Frazier, 1988).

Point Baker hunters travel an average of 9 miles to their most reliable deer hunting areas while Port Protection hunters travel an average of 12 miles. Point Baker hunters are less likely to hunt in areas above tree line, in areas that include roads or clearcuts of any age and are more likely to hunt in areas that include old-growth forest, muskeg, open beach, or grassy meadows

(Kruse and Frazier, 1988). Like Point Baker, Port Protection hunters are less likely to hunt in areas that includes roads or clearcuts of any age but, in addition to old-growth forest, muskeg, grassy meadow, and open beach, they are more likely to hunt in areas above tree line (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Point Baker and Port Protection households have ever used to hunt deer. Summarizing, the majority of Point Baker households hunt deer in Wildlife Analysis Areas (WAA's) 1529, and 5014. These WAA's are 58 and 6 percent accessible via existing roads. The majority of Port Protection households hunt deer in WAA's 1526, 1527, and 1529. These WAA's are 9, 45 and 58 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting for Point Baker occurred in WAA's 1529 (21 deer) and 1526 (6 deer) (ADF&G, 1989). These WAA's are 58 and 9 percent accessible via existing roads (Appendix K). Port Protection reported no deer harvested in 1989 (ADF&G, 1989).

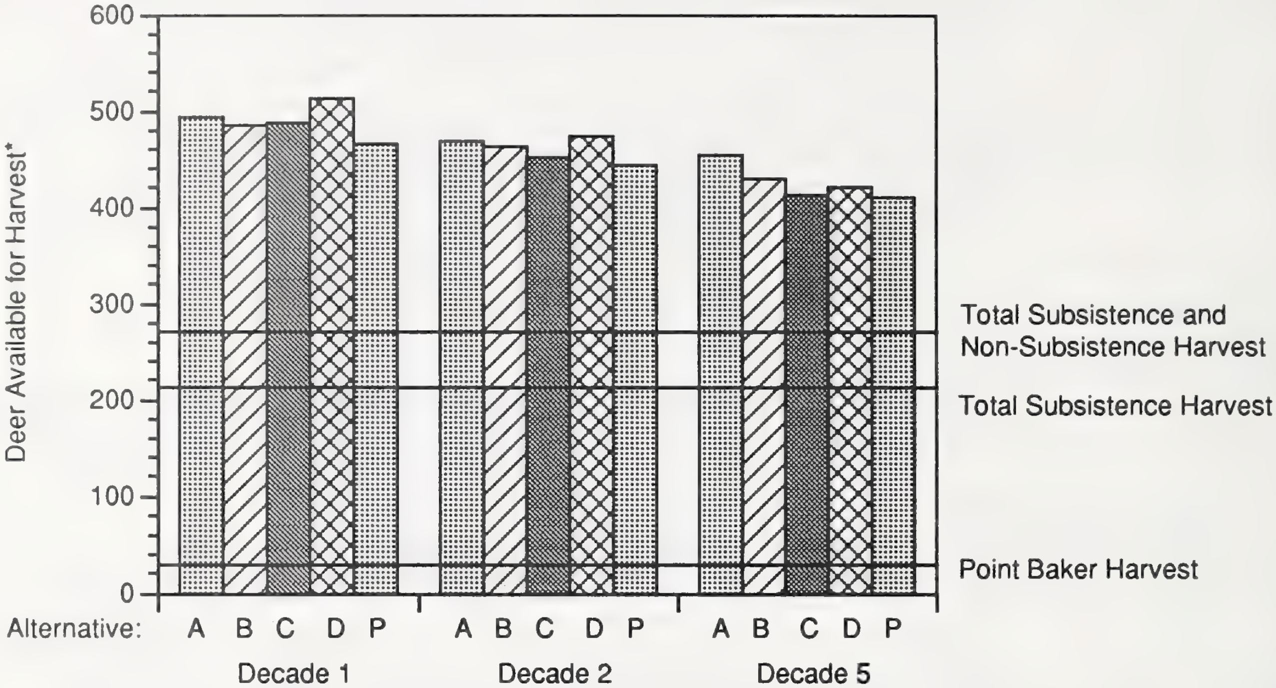
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 59 percent of the total edible pounds of subsistence resources harvested by Point Baker households and 80 percent harvested by Port Protection households.

Figure 3-113 displays the abundance, distribution and competition for deer only for the WAA's where Point Baker hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 27 percent of the total edible pounds of subsistence resources harvested by Point Baker households and 13 percent of the total edible pounds of subsistence resources harvested by Port Protection households (Kruse and Frazier, 1988). According to Alaska Department of Fish and Game's 1989 Deer Hunter Harvest Survey, no deer were harvested by Port Protection residents.

Figure 3-113

Deer Availability and Anticipated Harvest in Areas Used by Point Baker Households *



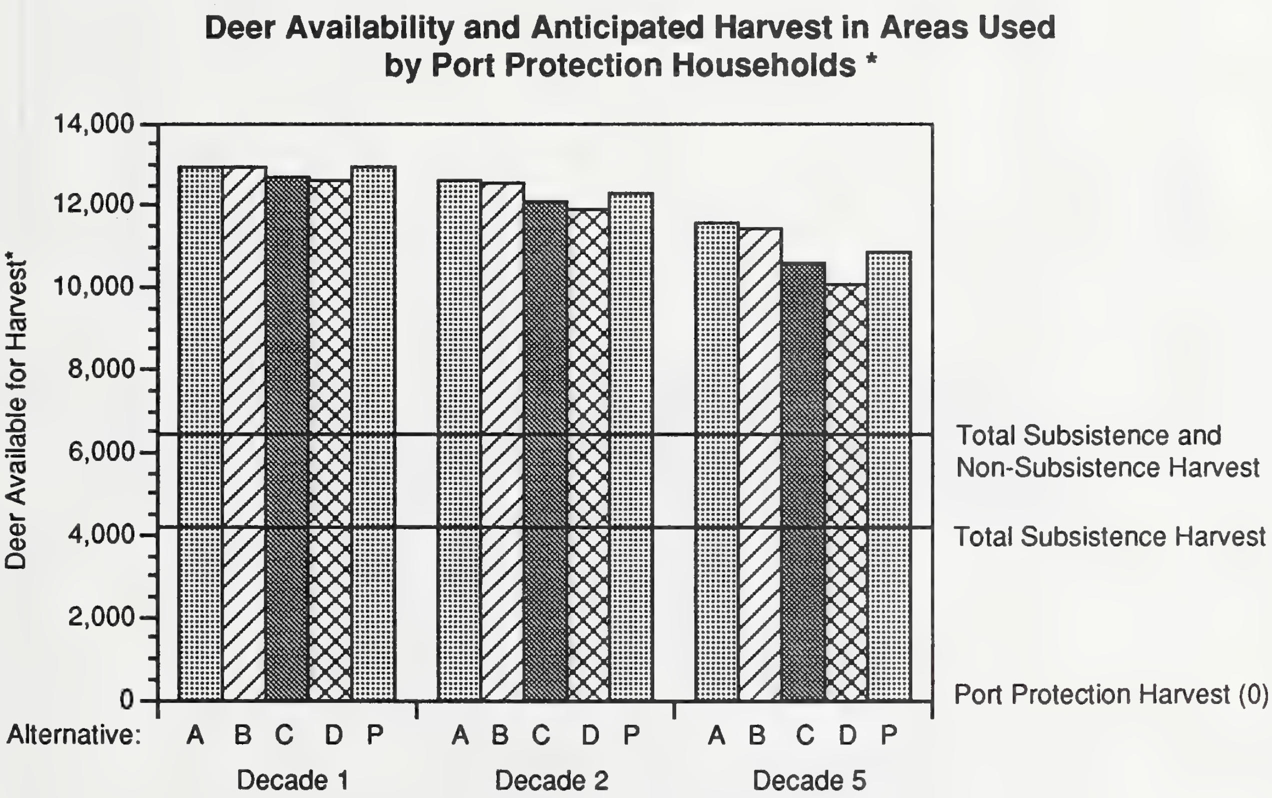
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (2 WAA's). Analysis does not include those WAA's 49 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figures 3-114 shows that the predicted need for deer for all subsistence and non-subsistence hunters will be met in all alternatives for the next 50 years in WAA's ever hunted by Port Protection households.

WAA's where the majority of Point Baker households hunt deer (1529, 5014) and are successful (1526, 1529) are allocated primarily to land use designations that allow timber harvesting. The exception is WAA 1526. WAA's where the majority of Port Protection households hunt deer (1526, 1527, 1529) are allocated primarily to land use designations that allow timber harvesting. Again, the exception is WAA 1526.

Figure 3-114



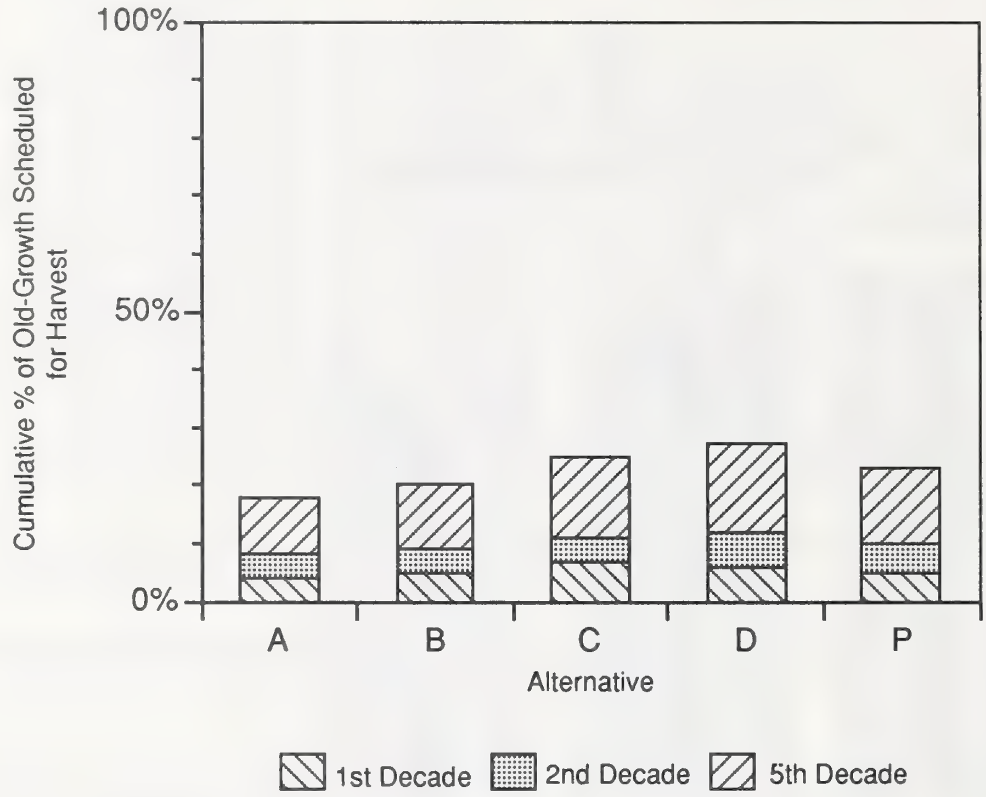
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's where community residents ever hunted deer (66 WAA's). According to ADF&G 1989 Deer Hunter Survey Statistics, no deer were harvested by Port Protection residents. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-115 shows that no more than 27 percent of the existing old-growth in WAA's ever hunted by Point Baker households will be harvested in any alternative for the next 50 years.

Figure 3-115

Cumulative Percent of Old-Growth Scheduled for Harvest in Areas Ever Hunted by Point Baker Households



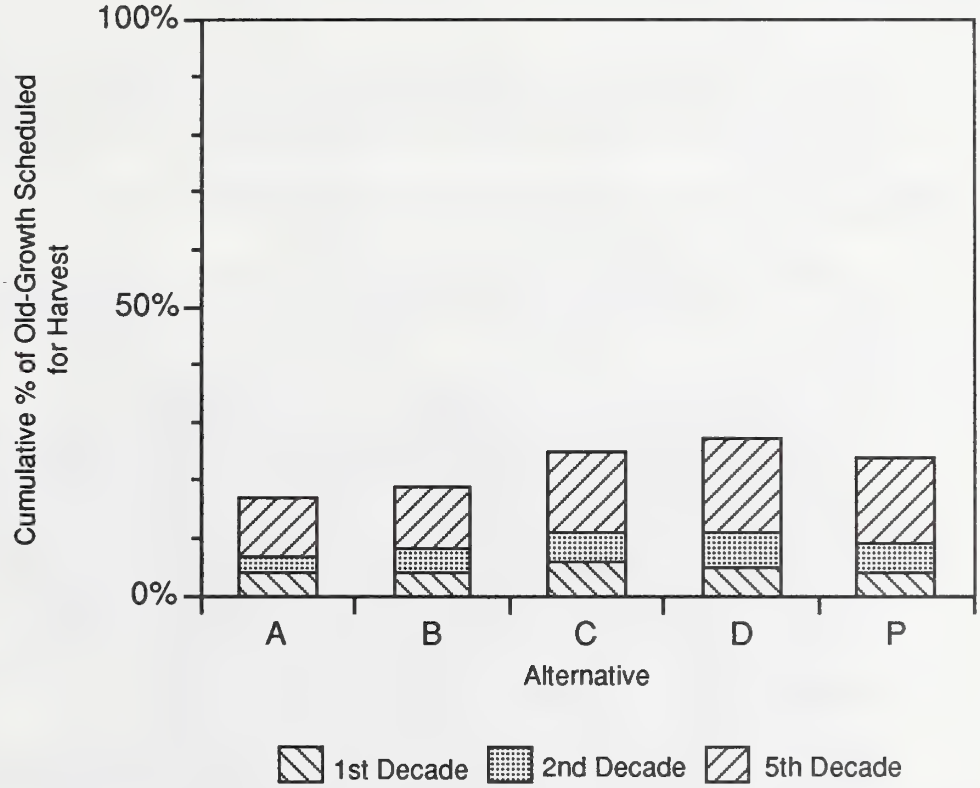
Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Likewise, Figure 3-116 shows that no more than 27 percent of the existing old-growth in WAA's ever hunted by Port Protection households will be harvested in any alternative for the next 50 years.

Figure 3-116

Cumulative Percent of Old-Growth Scheduled for Harvest in Areas Ever Hunted by Port Protection Households



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

The majority of recreation places near Point Baker and Port Protection are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative P; and, Timber Production in Alternatives C and D.

Port Alexander

Port Alexander is located on the south end of Baranof Island on the west side of Chatham Strait. Six percent of the population of 108 is Alaska Native.

With a protected harbor, Port Alexander attracted fishing boats as early as the 1920's. The community was settled by trollers who fished the Chatham Strait fishing grounds and prospered until the late 1930's. Land-based businesses developed along with the fishing industry. The last 20 years have brought a slow, steady increase in numbers of residents. People choose Port Alexander as a home because of its independent, subsistence lifestyle, and commercial fishing opportunities as well as its remote setting. There are no roads in Port Alexander; travel within the community is by skiff, boardwalks, and footpaths.

Economy

Fisheries employ almost three-quarters of the residents of Port Alexander. The other major economic sectors are educational services and local government. All economic sectors except government are highly seasonal. The average per capita income for Port Alexander is $6,000 (TRUCS, 2/89).

Opinions

A number of Port Alexander residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Port Alexander residents who responded to the issues along with the City of Port Alexander want more emphasis on fish, wildlife, and subsistence. The City wants the current timber sale program reduced and the long-term contracts terminated. The City does not want additional roads, log transfer facilities or connection to existing roads. While the City is opposed to emphasizing mineral exploration and development, individual repondents are split in their opinion with half wanting more emphasis and half wanting a mix. The City wants management to emphasize tourism, wildlife, recreation and subsistence sectors of the economy.

Subsistence and Recreation Use

Based on edible pounds harvested, deer at 36 percent and salmon and finfish other than salmon at 23 percent each are the most important subsistence resources for Port Alexander households (Kruse and Frazier, 1988). Port Alexander hunters travel an average of four miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include roads, clearcuts of any age, or grassy meadow and more likely to hunt in areas that include old-growth forest, muskeg, open beach, or above tree line (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Port Alexander households have ever used to hunt deer. Summarizing, the majority of Port Alexander households hunt deer in Wildlife Analysis Areas (WAA's) 3733, and 3734. These WAA's are roadless. As displayed on the Subsistence map, these areas are close to the community and a relatively small portion of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 3734 (46 deer) and 3733 (12 deer) (ADF&G, 1989). These WAA's are roadless (Appendix K).

Direct, Indirect and Cumulative Effects

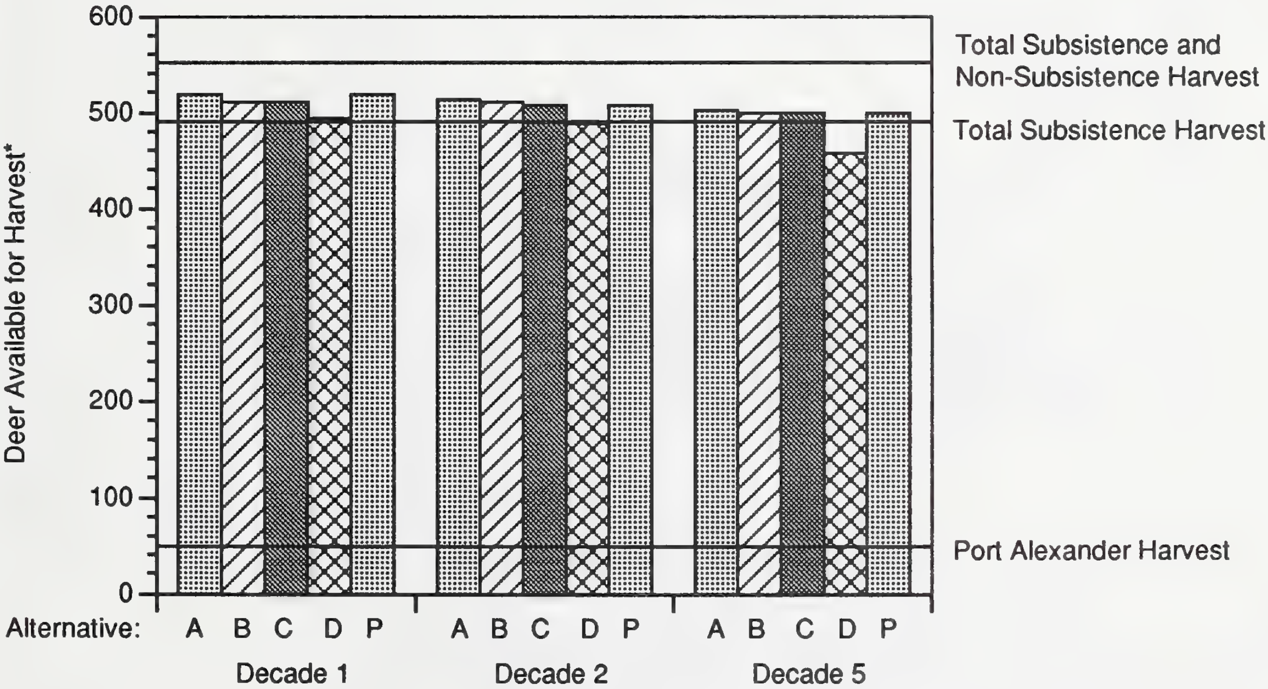
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 55 percent of the total edible pounds of subsistence resources harvested by Port Alexander households (Kruse and Frazier, 1988).

Figure 3-117 displays the abundance, distribution and competition for deer only for the WAA's where Port Alexander hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 36 percent of the total edible pounds of subsistence resources harvested by Port Alexander households (Kruse and Frazier, 1988).

WAA's where the majority of Port Alexander households hunt deer (3733, 3734) are also the WAA's most successfully hunted. These WAA's are allocated primarily to land use designations that do not allow timber harvesting. The exception is Alternative D for WAA 3734.

Figure 3-117

Deer Availability and Anticipated Harvest in Areas Used by Port Alexander Households *



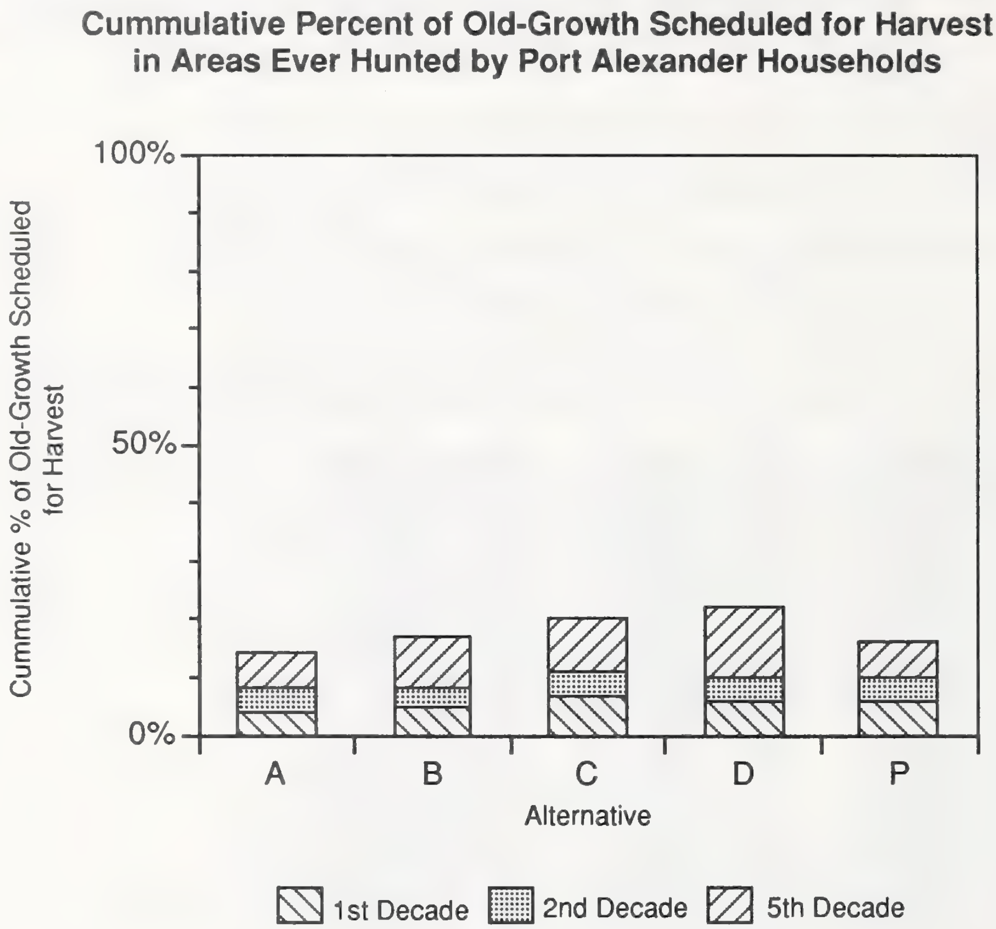
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (4 WAA's). Analysis does not include those WAA's (24 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-118 shows that no more than 22 percent of the existing old-growth in WAA's ever hunted by Port Alexander households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Port Alexander are allocated to natural setting land use designations in all alternatives.

Figure 3-118



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Saxman

Saxman is located on west Revillagigedo Island on the Tongass Highway, south of Ketchikan. Its population is 266 with 80 percent being Alaska Natives.

Tlingit Indians from the villages of Cape Fox and Tongass chose Saxman as their permanent home in 1894. Fishing and milling timber for themselves and the growing community of Ketchikan were its economic mainstays.

In the late 1930's artifacts and totem poles were retrieved from the original Cape Fox and Tongass village sites and placed in a totem park in Saxman. This park is now a major cultural and tourist attraction.

Economy

Being near Ketchikan, Saxman did not develop an independent economy until recently. Although Saxman residents still depend on Ketchikan for most services and employment opportunities, development of a barge terminal, a fishing fleet, and the Cape Fox Village Corporation investments have led to some recent growth in Saxman's population and economic base.

The major economic sector of Saxman is local government, followed by social and health services, retail trade, and fisheries. Saxman's economy is seasonal in all sectors except government. The average per capita income for Saxman residents in 1987 was about $7,000 (TRUCS, 2/89)

Opinions

Saxman residents provided oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Residents expressed concern about the effects of timber harvesting on subsistence salmon streams. They do not want logging in domestic watersheds or storage of timber where it will affect returning salmon. They expressed opposition to clearcutting and prefer only limited road construction. Concern was expressed for total traditional Native subsistence lifestyle and tribal sovereignty.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 37 percent, finfish other than salmon at 20 percent and deer at 19 percent are the most important subsistence resources for Saxman households (Kruse and Frazier, 1988). Saxman hunters travel an average of 20 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that are above tree line, or in areas that include young or older clearcuts, roads, or open beach and more likely to hunt in areas that include muskeg, old-growth forest, grassy meadow, or middle-aged clearcuts (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Saxman households have ever used to hunt deer. Summarizing, the majority of Saxman households hunt deer in 26 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1003, 1422, and 1531 are most heavily used. These WAA's are 83, 58 and 90 percent accessible via existing roads. As displayed on the Subsistence map, these areas are quite a distance from the community on Prince of Wales Island and portions of these areas are also recreation places. Saxman reported no deer harvested in 1989 (ADF&G, 1989). Although there are no roads in this area, 69 percent of the area falls within a recreation place. WAA's 3308 and 3315 were also productive in terms of deer hunting. They are not heavily roaded; 36 and 11 percent respectively.

Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 68 percent of the total edible pounds of subsistence resources harvested by Saxman households (Kruse and Frazier, 1988).

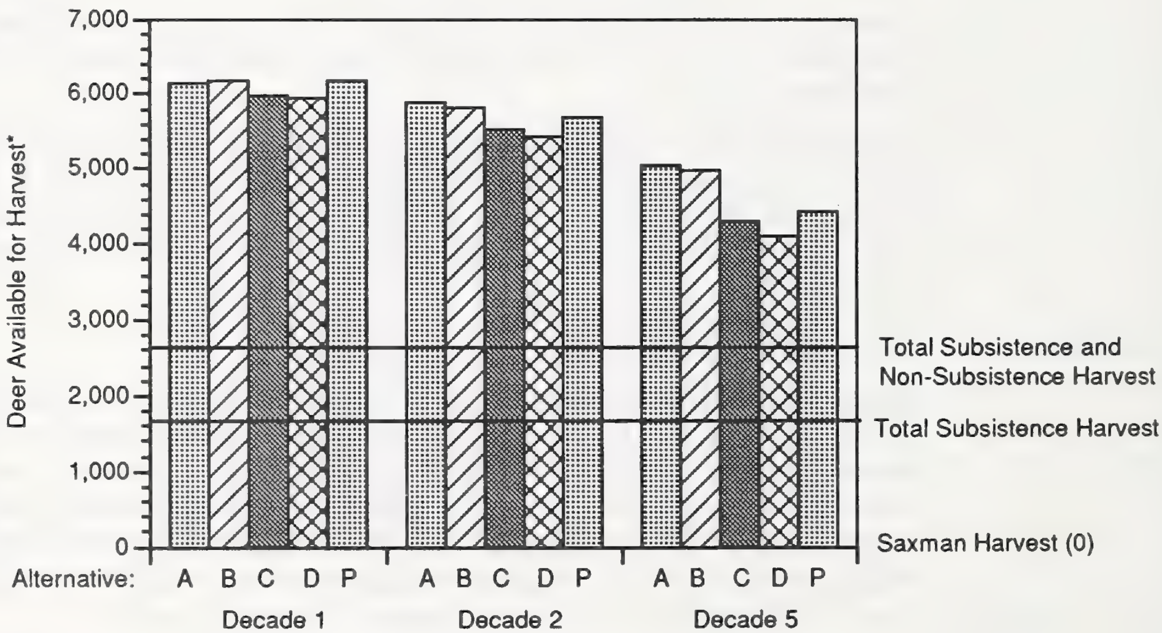
Figure 3-119 displays the abundance, distribution and competition for deer in the WAA's ever hunted by Saxman households. According to Alaska Department of Fish and Game's 1989 Deer Hunters Survey, no deer were reported harvested by Saxman residents. The predicted need for deer, for Saxman and other subsistence hunters will be met in each alternative for the next 50 years. Deer accounts for 19 percent of the total edible pounds of subsistence resources harvested by Saxman households (Kruse and Frazier, 1988).

The predicted need for deer for non-subsistence hunters cannot be met in any alternative at 10 percent of the habitat capability. However, at 20 percent of the habitat capability, the predicted need for deer for all hunters (subsistence and non-subsistence) can be met.

WAA's where the majority of Saxman households hunt deer (1003, 1422, 1531) are allocated primarily to land use designations that allow timber harvesting.

Figure 3-119

Deer Availability and Anticipated Harvest in Areas Used by Saxman Households *



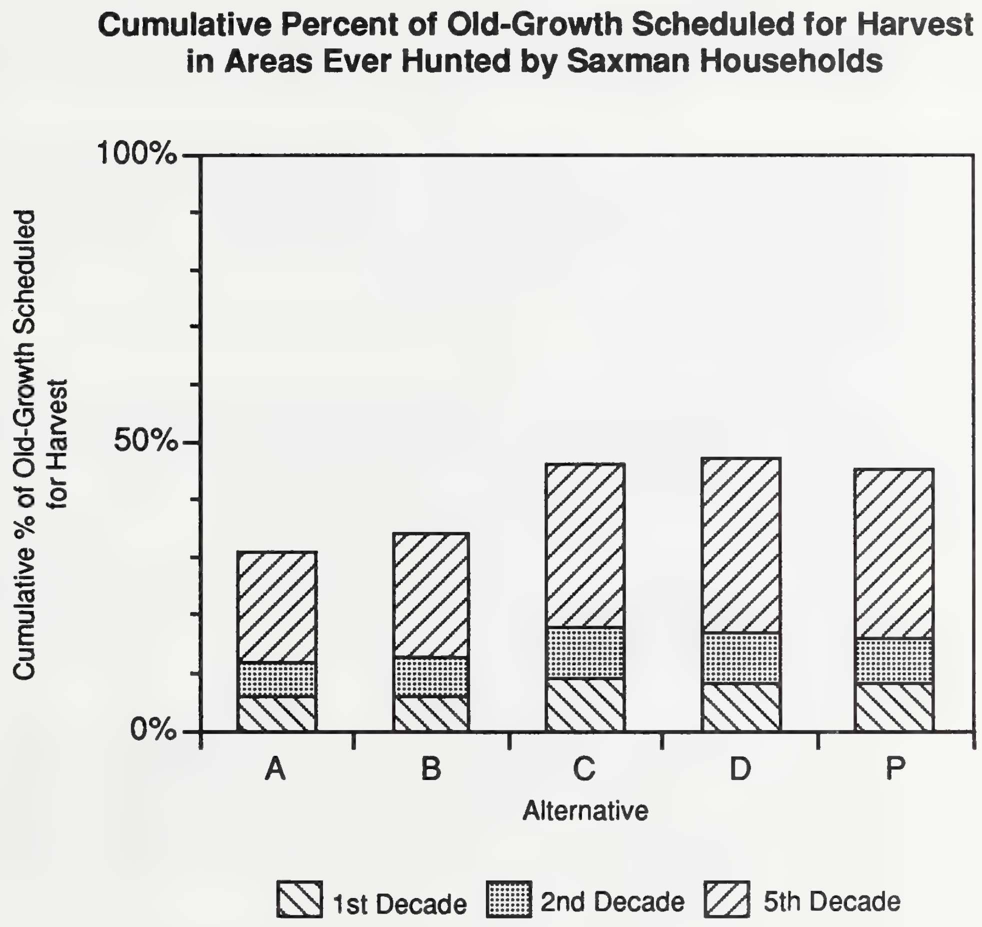
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted for those WAA's where community residents ever hunted deer (27 WAA's). According to ADF&G 1989 Deer Hunter Survey Statistics, no deer were harvested by Saxman residents. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-120 shows that between six percent (Alternative A, first decade) and 47 percent (Alternative D, fifth decade) of the existing old-growth in WAA's ever hunted by Saxman households will be harvested over the next 50 years.

The majority of recreation places near Saxman are allocated to natural setting land use designations in all alternatives.

Figure 3-120



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Sitka

Located on the west side of Baranof Island, Sitka is the only community in Southeast Alaska which fronts the open sea. Twenty percent of Sitka's population of 8,196 is Alaska Native. Present-day Sitka, contains a separate Indian Village (Sitka Kwan), within the community.

Originally settled by the Tlingit people, it became the focal point of Russian fur trade in North America beginning in 1741. Russian hunting of the sea otter continued for over 50 years, and almost decimated the resource. With the demise of the fur industry in the 1860's, Russia lost interest in her North American colony.

Economy

After fur trade, fishing and fish processing dominated Sitka's economy for a time. Currently Sitka's economy is based on pulp manufacture, tourism, education, commercial fishing and services, local, state, and federal government.

Nearly equal numbers of people are employed in health and social services, retail trade, and educational services with smaller numbers being employed in fisheries and wood processing. Sitka's economy is seasonal in the manufacturing and construction sectors. Sitka's average per capita income is $14,500, the highest of communities surveyed by the Tongass Resource Use Cooperative Survey in Southeast Alaska.

Opinions

A number of Sitka residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Sitka residents who responded to the issues, and the City and Borough of Sitka, requested that additional emphasis be placed on scenic resources. While individuals requested that less emphasis be placed on managing for recreation, the Sitka State Parks Advisory Board requested that additional emphasis be placed on recreation.

The City and Borough wants additional emphasis on fish but individuals are split in their opinion with half wanting more emphasis on fish and half satisfied with the current management mix. The City and Borough requested additional emphasis on wildlife and the Sitka Advisory Committee requested additional emphasis on subsistence. Individuals are split with some wanting more emphasis on subsistence, some less, and still others satisfied with existing management emphasis.

The City and Borough recommended that the current timber sale program continue. However, residents were split in their opinion with half wanting the same mix of emphasis and half wanting less timber harvest. Individual respondents favored additional roads, transfer facilities, and encouraged connecting existing roads. Certain residents also support additional emphasis on access for mineral exploration and development. The City and Borough of Sitka indicated preference for exchanging some Wilderness-like areas for portions of existing Wilderness. While individual respondents favored emphasizing timber and mining economic sectors, Sitka State Parks Advisory Board want management to emphasize tourism, wildlife, recreation, and subsistence.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 28 percent, deer at 27 percent and finfish other than salmon at 25 percent are the most important subsistence resources for Sitka households (Kruse and Frazier, 1988). Sitka hunters travel an average of 24 miles to their most reliable

deer hunting areas. They are less likely to hunt in areas that include clearcuts of any age, or roads, and more likely to hunt in areas that include old-growth forest, muskeg, grassy meadows, areas above tree line, or open beaches (Kruse and Frazier, 1988).

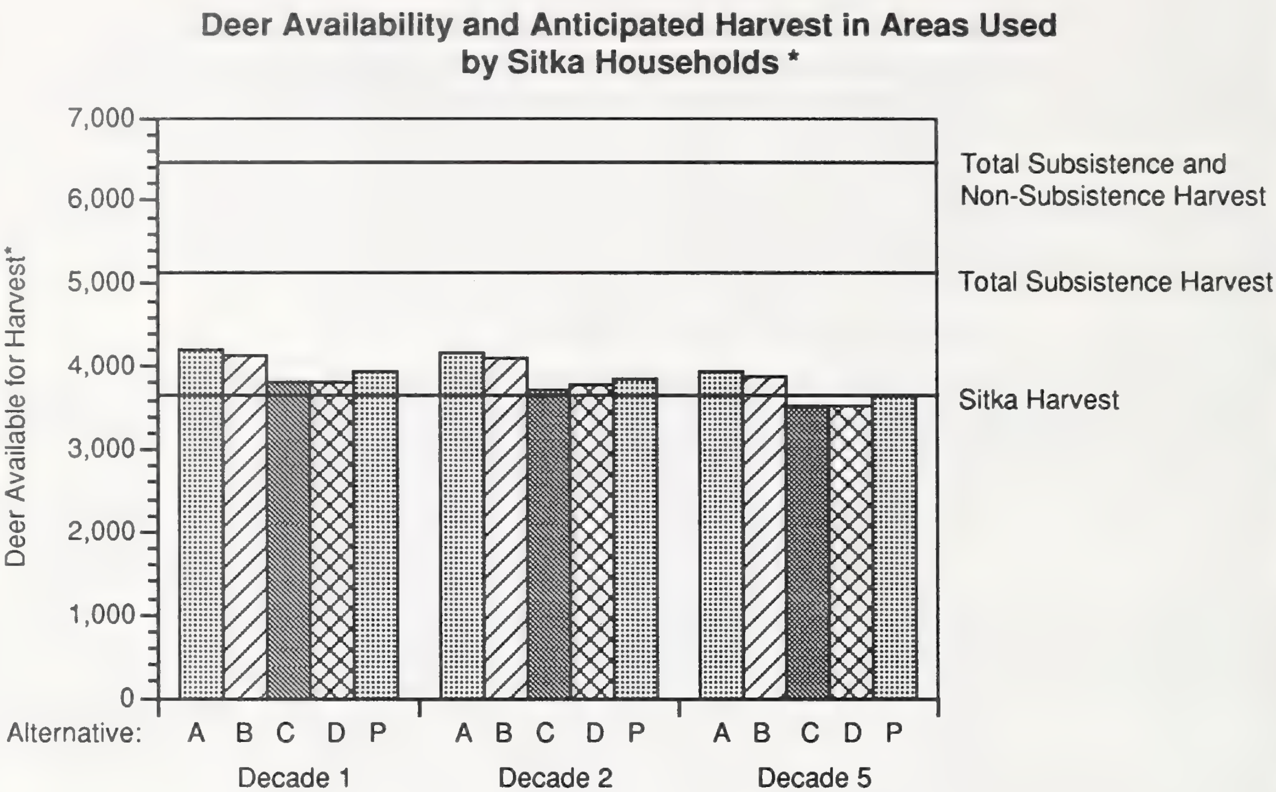
Appendix K provides detailed information about the areas that Sitka households have ever used to hunt deer. Summarizing, the majority of Sitka households hunt deer in 14 Wildlife Analysis Areas. Based on percent of the WAA used, WAA's 3001, 3002, and 3314 are most heavily used. These WAA's are 19, 12 and 13 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 3002 (586 deer), 3001 (516 deer) and 3003 (426 deer) (ADF&G, 1989). These WAA's are 12, 19 and 9 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 69 percent of the total edible pounds of subsistence resources harvested by Sitka households (Kruse and Frazier, 1988).

Figure 3-121 displays the abundance, distribution and competition for deer only for the WAA's where Sitka hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Sitka hunters will be met for the next 10 years in all alternatives. However the predicted need for deer for Sitka hunters cannot be met by many alternatives beyond 10 years at 10 percent of habitat capability. At 20 percent of habitat capability, the predicted need for deer can be met. Deer accounts for 27 percent of the total edible pounds of subsistence resources harvested by Sitka households (Kruse and Frazier, 1988).

Figure 3-121



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (27 WAA's). Analysis does not include those WAA's (57 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

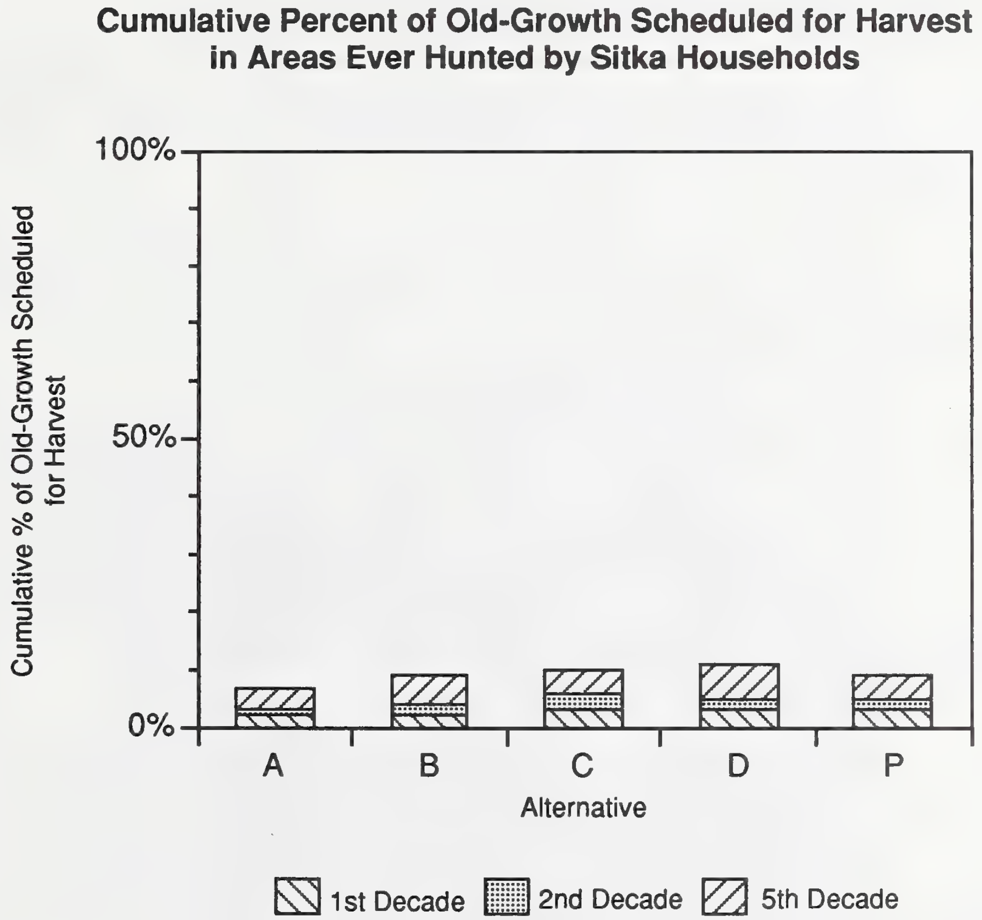
Considering all the WAA's ever hunted by Sitka residents, the predicted need for deer for all subsistence users can be met in all alternatives for the next 50 years. However, the predicted need for non-subsistence hunters cannot be met in any alternative at 10 percent of the habitat capability. At 20 percent of habitat capability, the predicted need for deer for non-subsistence hunters can be met for the next 50 years in all alternatives.

WAA's where the majority of Sitka households hunt deer (3001, 3002, 3314) and are most successful (3001, 3002, 3003) are allocated primarily to land use designations that allow timber harvesting. Exceptions are: Alternative A and B for WAA 3001; and, Alternative D for WAA 3002.

Figure 3-122 shows that no more than 11 percent of the existing old-growth in WAA's ever hunted by Sitka households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Sitka are allocated to natural setting land use designations in Alternatives A, B, D and P; and, Scenic Viewshed or Modified Landscape in Alternative C.

Figure 3-122



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Skagway

Founded in 1896 at the tip of Taiya Inlet at the extreme North end of Lynn Canal, is the town of Skagway. More than 20,000 gold seekers traveled through Skagway on their way to the Klondike Gold Fields. Many miners who arrived in the late fall actually overwintered in Skagway before starting their journeys in search of gold. With the ebbing of the Gold Rush, Skagway's population dwindled.

Today, six percent of Skagway's 585 are Alaska Native. It is the shipping center for zinc and copper from the Yukon. The present mainstay of Skagway's economy is tourism. Approximately 145,000 tourists visit Skagway each year.

Economy

Major employment sectors of Skagway are retail trade, entertainment, recreation, and tourist services, and transportation, communications and utilities. Skagway's economy is highly seasonal in all sectors. The average per capita income of Skagway is $12,000 (TRUCS, 2/89).

Opinions

A number of Skagway residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Skagway residents who responded to the issues recommended that the Forest be managed for both scenic quality and timber harvesting, with more emphasis on recreation. Community opinion was split on fish management and wildlife management with half wanting more emphasis and half satisfied with existing emphasis. Respondents to the issues requested that the current timber sale program continue with a mix of management emphasis to include other resources. Some offering oral testimony indicated that any alternative placing the area around Skagway in primitive or semi-primitive recreation was acceptable. Others indicated a preference for stopping clearcutting Forest-wide.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 34 percent, finfish other than salmon at 31 percent and invertebrates at 23 percent are the most important subsistence resources for Skagway households. Deer comprise only 6 percent of the total edible pounds harvested (Kruse and Frazier, 1988). Skagway hunters travel an average of 155 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include clearcuts of any age, roads, or areas above tree line and more likely to hunt in areas that include old-growth forest, muskeg, open beaches, or grassy meadows (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Skagway households have ever used to hunt deer. Summarizing, the majority of Skagway households hunt deer in 19 Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 3523, 3524, and 3551 are most heavily used. These WAA's are 22, 4 and 35 percent accessible via existing roads. As displayed on the Subsistence map, these areas are quite a distance from the community and relatively large portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 3629 (19 deer) and 3310 (16 deer) (ADF&G, 1989). These WAA's are 7 and 11 percent accessible via existing roads (Appendix K).

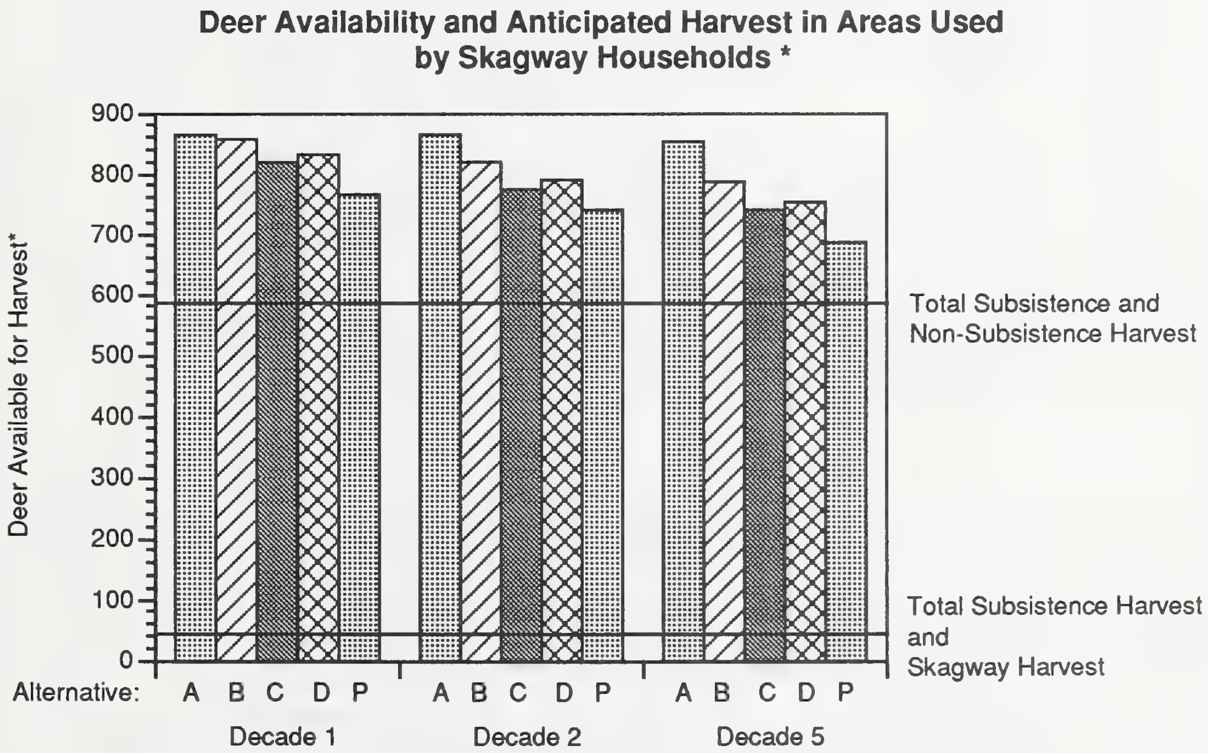
Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 88 percent of the total edible pounds of subsistence resources harvested by Skagway households (Kruse and Frazier, 1988).

Figure 3-123 displays the abundance, distribution and competition for deer only for the WAA's where Skagway hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for fraction of the total edible pounds of subsistence resources harvested by Skagway households (Kruse and Frazier, 1988).

WAA's where the majority of Skagway households hunt deer (3523, 3524, 3551) and are successful (3310, 3629) are allocated primarily to land use designations that allow timber harvesting. Exceptions are Alternatives A, B and C for WAA's 3523 and 3629.

Figure 3-123



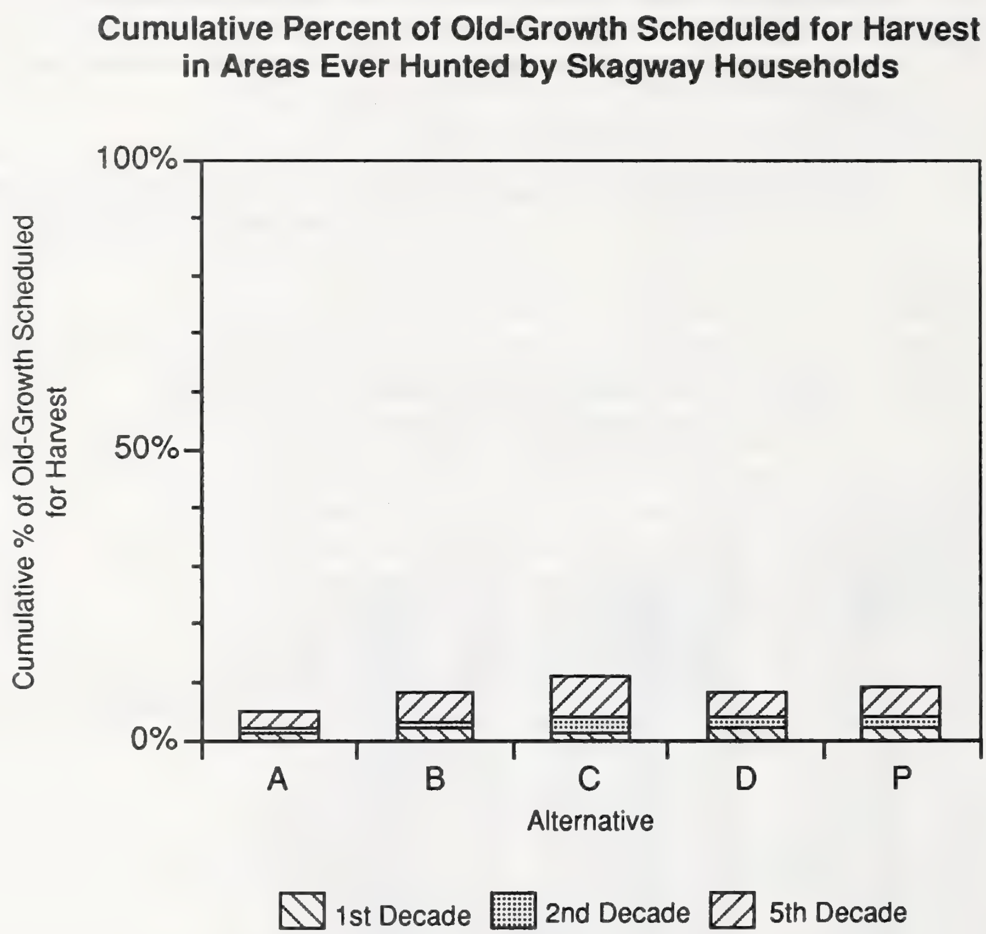
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (6 WAA's). Analysis does not include those WAA's (23 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-124 shows that no more than 11 percent of the existing old-growth in WAA's ever hunted by Skagway households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Skagway are allocated to natural setting land use designations in all alternatives.

Figure 3-124



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Tenakee Springs

With a population of 95 residents (seven percent Alaska Native), Tenakee Springs is located 50 miles northeast of Sitka on the north shore of Tenakee Inlet (east Chichagof Island). Access to Tenakee is by floatplane or the Alaska Marine Highway.

Historically, Tenakee Springs was a favorite wintering spot for early prospectors and miners. Today, many Tenakee Springs residents are retired and younger families are moving in, attracted by the slower pace of life and opportunities for a subsistence lifestyle. It has the highest percentage of senior citizens of any community in Alaska.

Tenakee is popular with area people and a favorite stop for boaters. A number of Juneau residents maintain second homes there. Logging began at nearby Corner Bay and along the Indian River Road in the early 1970's and continues intermittently.

Economy

The major employers of Tenakee Springs are fisheries, retail trade, and local government with all sectors being highly season except government. The average annual per capita income in Tenakee Springs is $9,000 (TRUCS, 2/89).

Opinions

A number of Tenakee Springs residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Tenakee Springs residents who responded to the issues, and the City of Tenakee Springs, want to see more emphasis placed on scenic resources, recreation, fish, wildlife, and subsistence. They want the current timber sale program reduced, and the long-term sales terminated. They do not feel that jobs should be the reason for making forest-use decisions. Neither respondents nor the City want additional roads, log transfer facilities or connections to existing roads. More roads means more hunter access and fewer deer. They are opposed to emphasis on mineral exploration and development and favor additional Wilderness designations. They want management to emphasize tourism, wildlife, recreation and subsistence sectors of the economy.

Subsistence and Recreation Use

Based on edible pounds harvested, deer at 39 percent, finfish other than salmon at 24 percent and invertebrates at 17 percent are the most important subsistence resources for Tenakee Springs households (Kruse and Frazier, 1988). Tenakee Springs hunters travel an average of seven miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include clearcuts of any age, roads, or areas above tree line and more likely to hunt in areas that include old-growth forest, muskeg, grassy meadows, or open beaches (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Tenakee Springs households have ever used to hunt deer. Summarizing, the majority of Tenakee Springs households hunt deer in eight Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 3526, 3627, and 3628 are most heavily used. These WAA's are 35, 22 and 7 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 3526 (49 deer), 3629 (18 deer) and 3525 (10 deer) (ADF&G, 1989). These WAA's are 35, 7 and 35 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

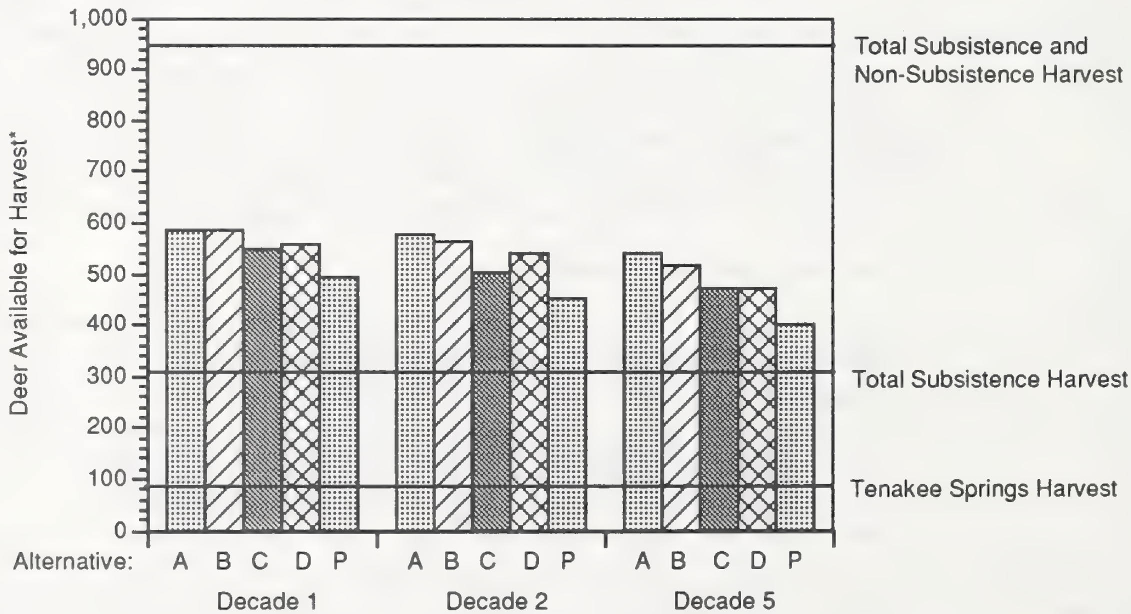
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 55 percent of the total edible pounds of subsistence resources harvested by Tenakee Springs households (Kruse and Frazier, 1988).

Figure 3-125 displays the abundance, distribution and competition for deer only for the WAA's where Tenakee Springs hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Tenakee Springs and other subsistence hunters will be met in each alternative for the next 50 years. Deer accounts for 39 percent of the total edible pounds of subsistence resources harvested by Tenakee Springs households (Kruse and Frazier, 1988).

The predicted need for deer for non-subsistence hunters cannot be met in any alternative at 10 percent of the habitat capability in those WAA's where Tenakee Springs hunters successfully harvested deer. However, at 20 percent of habitat capability, the predicted need for deer for all subsistence hunters can be met in all alternatives in all decades. non-subsistence deer needs cannot be met in Alternative P in the second decade or in Alternatives C, D or P in the fifth decade.

Figure 3-125

Deer Availability and Anticipated Harvest in Areas Used by Tenakee Springs Households *



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (5 WAA's). Analysis does not include those WAA's (44 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

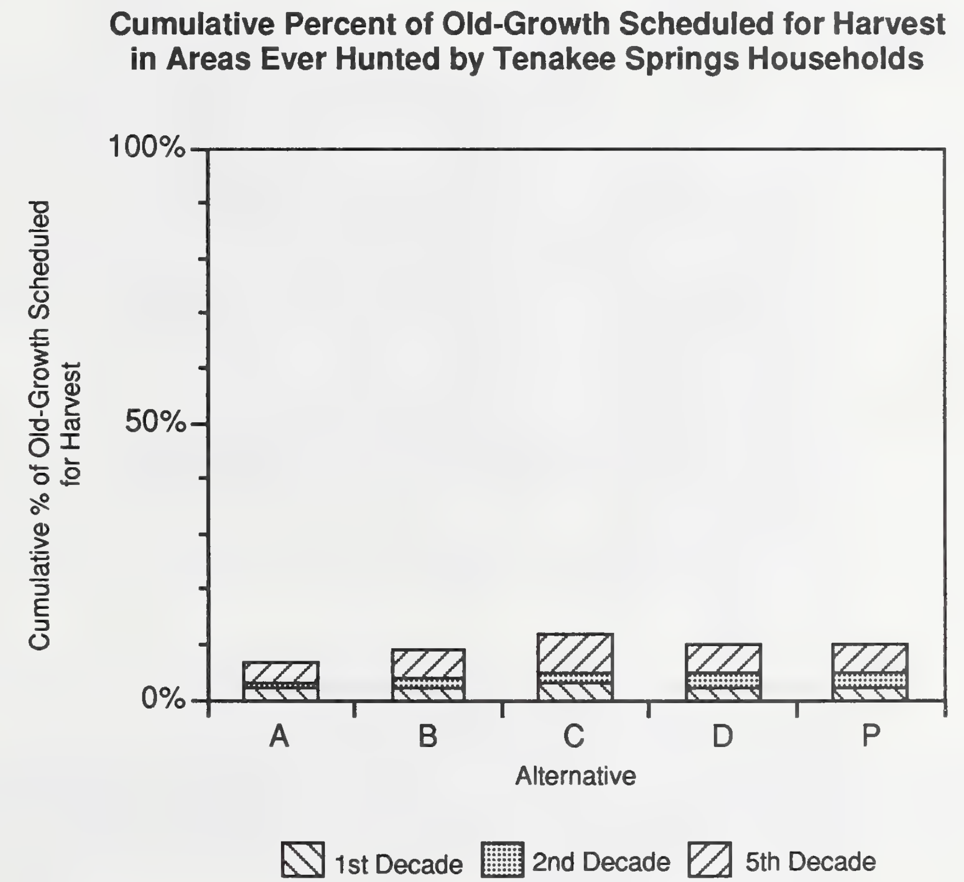
Considering all the WAA's ever hunted by Tenakee Springs residents, the predicted need for deer for non-subsistence hunters cannot be met in any alternative at 10 percent of the habitat capability. However, at 20 percent of habitat capability, the predicted need for deer for non-subsistence hunters can be met for the next 50 years in all alternatives.

WAA's where the majority of Tenakee Springs households hunt deer (3526, 3627, 3628) and are successful (3525, 3526, 3629) are allocated primarily to land use designations that allow timber harvesting. Exceptions are: Alternatives A and B for WAA 3526; and, Alternatives A, B and C for WAA 3629.

Figure 3-126 shows that no more than 12 percent of the existing old-growth in WAA's ever hunted by Tenakee Springs households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Tenakee Springs are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative D; and, Timber Production in Alternatives C and P.

Figure 3-126



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Thorne Bay

Located at the head of Thorne Bay on eastern Prince of Wales Island is the community of Thorne Bay. Built in 1960 to replace a logging camp previously near Hollis, Thorne Bay has grown as a center of timber harvest activity for the east Prince of Wales Island Area. Since 1960, over 700 miles of road have been developed on the Island. These roads now connect Thorne Bay with most other communities on Prince of Wales Island. State land sales, municipal government, and the development of new economic sectors have led to its present status as a permanent community, although its economy is still tied to the timber industry. The present population of Thorne Bay is 477. Three percent of the population is Alaska Native.

Economy

Forestry and wood processing employ the major amount of Thorne Bay's populations with the other major employer being retail trade. Over 80 percent of the population remains in the community year-round. The average per capita income of Thorne Bay is $11,000 (TRUCS, 2/89).

Opinions

A number of Thorne Bay residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Thorne Bay residents are split in their opinion on management of scenic resources. Half want more emphasis on scenic resources while half want less. Thorne Bay residents who responded to the issues want more emphasis on fish and wildlife but think that current emphasis on subsistence is adequate. They are split in their opinion of emphasis on timber harvesting with half wanting the same mix of emphasis and half wanting less timber harvesting. Those responding to the issues indicated they do not want additional roads, log transfer facilities or to be connected to existing roads. Some want management to emphasize recreation, tourism and fishing sectors of the economy while others want commodity industries emphasized.

Subsistence and Recreation Use

Based on edible pounds harvested, finfish other than salmon at 40 percent, salmon at 25 percent and deer at 20 percent are the most important subsistence resources for Point Baker households (Kruse and Frazier, 1988). Thorne Bay hunters travel an average of 18 miles to their most reliable deer hunting areas. They are less likely to hunt in areas that include open beach, are above tree line, or include middle-aged or older clearcuts, or grassy meadow and more likely to hunt in areas that include muskeg, old-growth forest, roads, or young clearcuts (Kruse and Frazier, 1988).

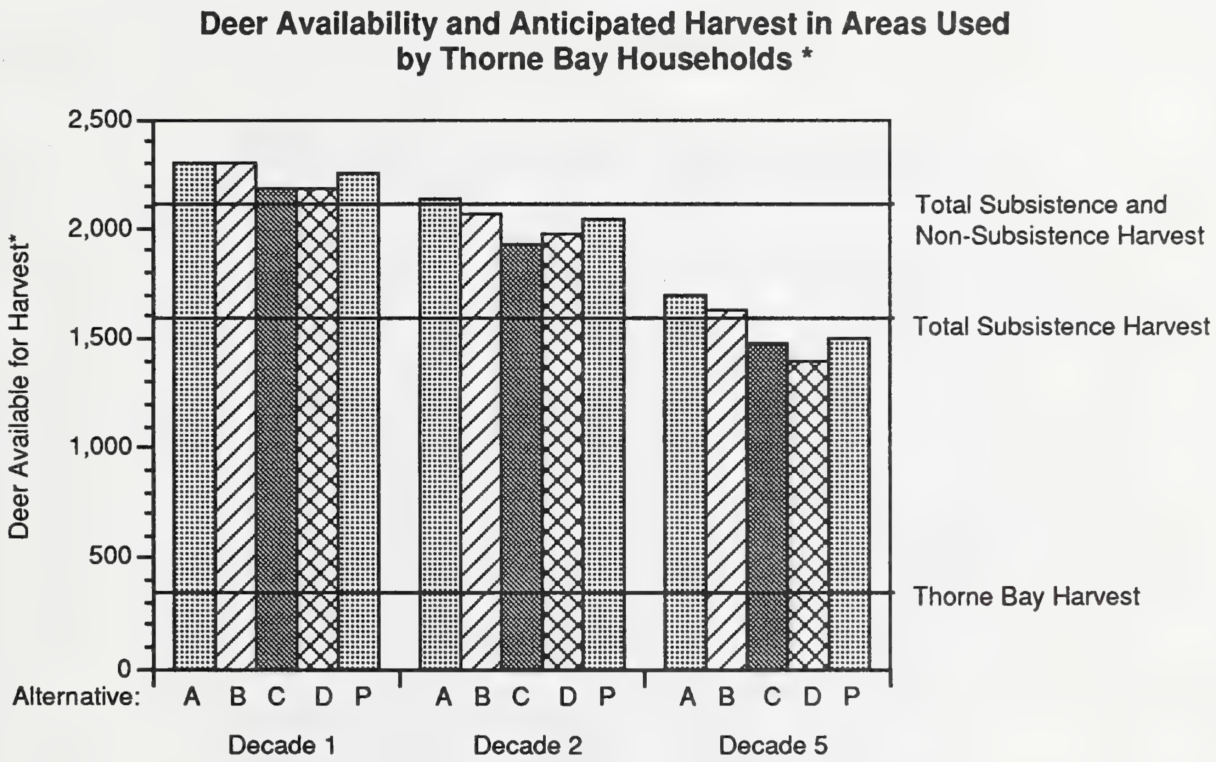
Appendix K provides detailed information about the areas that Thorne Bay households have ever used to hunt deer. Summarizing, the majority of Thorne Bay households hunt deer in Wildlife Analysis Areas (WAA's) 1315, and 1319. These WAA's are 58 and 30 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 1319 (111 deer), 1422 (65 deer) and 1315 (59 deer) (ADF&G, 1989). These WAA's are 30, 58 and 58 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 75 percent of the total edible pounds of subsistence resources harvested by Thorne Bay households (Kruse and Frazier, 1988).

Figure 3-127 displays the abundance, distribution and competition for deer only for the WAA's where Thorne Bay hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for Thorne Bay can be met in each alternative for the next 50 years. Deer accounts for 20 percent of the total edible pounds of subsistence resources harvested by Thorne Bay households (Kruse and Frazier, 1988).

Figure 3-127



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (11 WAA's). Analysis does not include those WAA's (24 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

The predicted need for deer for subsistence users other than Thorne Bay and for non-subsistence users cannot be met in any alternative at 10 percent of the habitat capability in those WAA's where Thorne Bay hunters successfully harvested deer. However, these needs can be met in all alternatives for the next 50 years at 20 percent of the habitat capability.

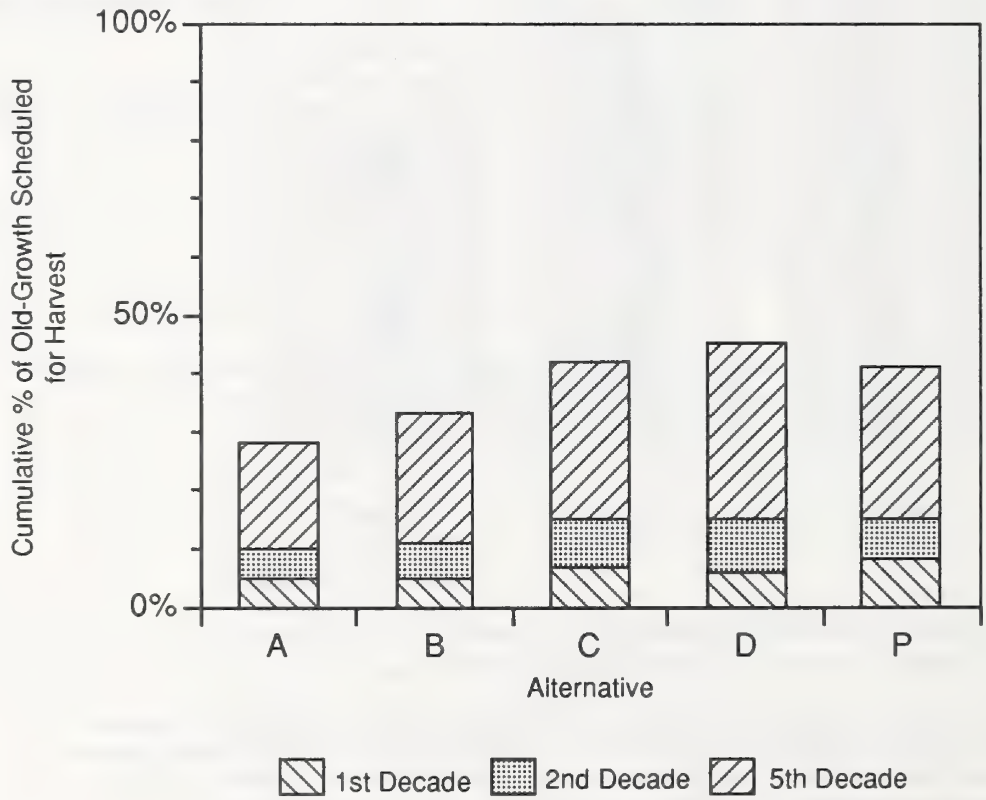
Considering all the WAA's ever hunted by Thorne Bay residents, the predicted need for deer for all subsistence and non-subsistence users can be met in all alternatives for the next 50 years at 10 percent of the habitat capability.

WAA's where the majority of Thorne Bay households hunt deer (1315, 1319) and are successful (1315, 1319, 1422) are are allocated primarily to land use designations that allow timber harvesting.

Figure 3-128 shows that between five percent (Alternative A, first decade) and 45 percent (Alternative D, fifth decade) of the existing old-growth in WAA's ever hunted by Thorne Bay households will be harvested over the next 50 years. The majority of recreation places near Thorne Bay are allocated to natural setting land use designations in Alternatives A and B; Scenic Viewshed or Modified Landscape in Alternative P; and, Timber Production in Alternatives C and D.

Figure 3-128

Cumulative Percent of Old-Growth Scheduled for Harvest in Areas Ever Hunted by Thorne Bay Households



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Wrangell

Originally inhabited by Tlingit Indians, Wrangell is located on the northern tip of Wrangell Island near the Stikine River. Thirty-eight percent of the population of 2,913 is Native Alaskan. This community has flown the flags of three nations, England, Russian, and the United States. The late 19th century saw Wrangell become a supply center for gold miners and prospectors during three gold rushes.

Economy

Today, timber, fishing, and fish processing dominate Wrangell's economy. More than 100 residents fish commercially and for nearly 50 percent of them, its their major source of income. Tourism is also a growing influence in the area. No information was available on Wrangell's per capita income.

Opinions

A number of Wrangell residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

Wrangell residents who responded to the issues are split in their opinion on managing for scenic resources with half wanting more emphasis and half wanting the Forest to be managed for both scenic quality and timber harvesting. The City of Wrangell recommended that some areas be cut progressively at a moderate rate rather than heavily at a rapid rate to maintain scenic quality. Individual respondents recommended additional emphasis be placed on recreation, particularly developed sites. The City recommended a mix of management emphasis on recreation and other Forest uses including timber harvesting and mining.

While individual respondents recommended greater emphasis on fisheries, the City believes the current mix of management for fish and timber harvesting is sufficient. Individuals want additional emphasis on wildlife habitat. The City favors the current timber sale program and the long-term contracts. However, residents are split with half wanting the same mix of timber emphasis and half wanting less timber harvesting. The City favors additional roads, log transfer facilities, and connections to existing roads, particularly a connection to Canada. Individual respondents oppose emphasizing mineral exploration and development while the City favors maintaining current management emphasis for mineral exploration and development. Individuals were split between emphasizing timber harvesting, mining, and a mix between these and amenity industries.

Those offering oral testimony presented differing opinions. Some wanted the timber program to be emphasized siting the importance of the timber industry to the community as a whole. They believe Wrangell cannot survive on fishing and tourism alone. Others believe there is already too much emphasis on timber harvesting and that the current program should be reduced.

Subsistence and Recreation Use

Appendix K provides detailed information about the areas that Wrangell households have ever used to hunt deer. Summarizing, the majority of Wrangell households hunt deer in seven Wildlife Analysis Areas (WAA's). Based on percent of the WAA used, WAA's 1903, 1904, and 1906 are most heavily used. These WAA's are 32, 47 and 48 percent accessible via existing roads. As displayed on the Subsistence map, these areas are close to the community and relatively large portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 1904 (113 deer), 1530 (61 deer) and 3733 (46 deer) (ADF&G, 1989). These WAA's are 47, 55 and 0 percent accessible via existing roads (Appendix K).

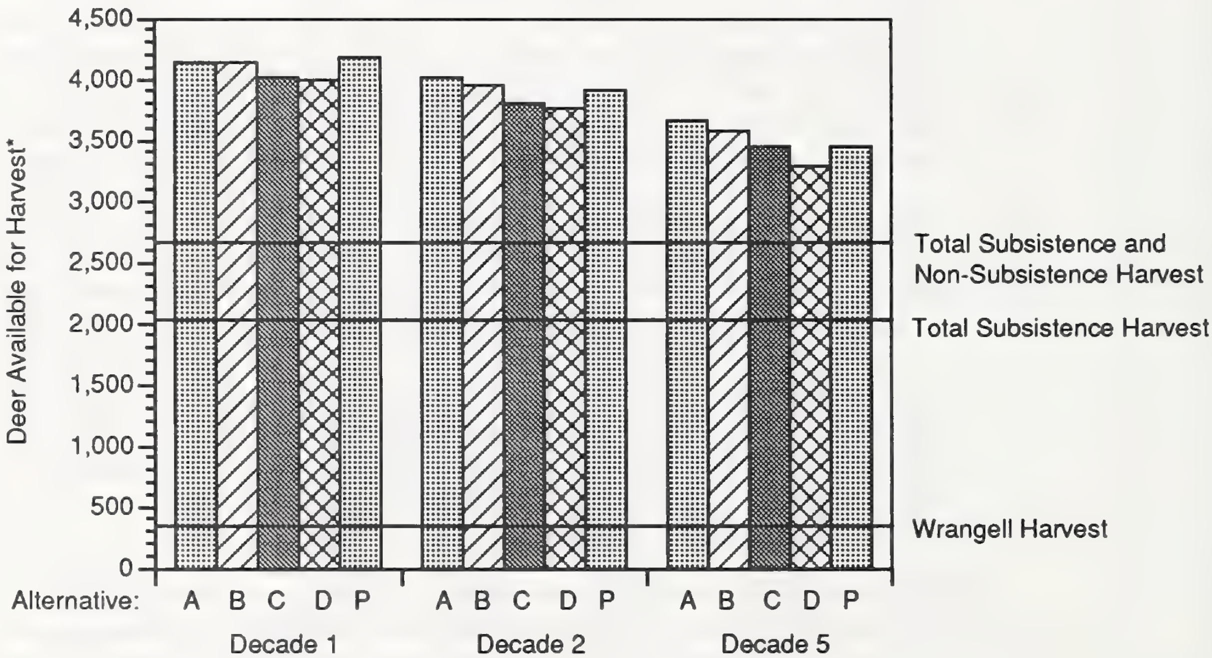
Direct, Indirect and Cumulative Effects

Figure 3-129 displays the abundance, distribution and competition for deer only for the WAA's where Wrangell hunters successfully harvested deer. (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer, for both subsistence and non-subsistence hunters, will be met in each alternative for the next 50 years. Deer accounts for 21 percent of the total edible pounds of subsistence resources harvested by Wrangell households (Kruse and Frazier, 1988).

WAA's where the majority of Wrangell households hunt deer (1903, 1904, 1906) and are successful (1904, 1530, 3733) are allocated primarily to land use designations that allow timber harvesting. Exceptions are: Alternatives A and B in WAA 1904; and, Alternatives A, B and D in WAA 1906.

Figure 3-129

Deer Availability and Anticipated Harvest in Areas Used by Wrangell Households *



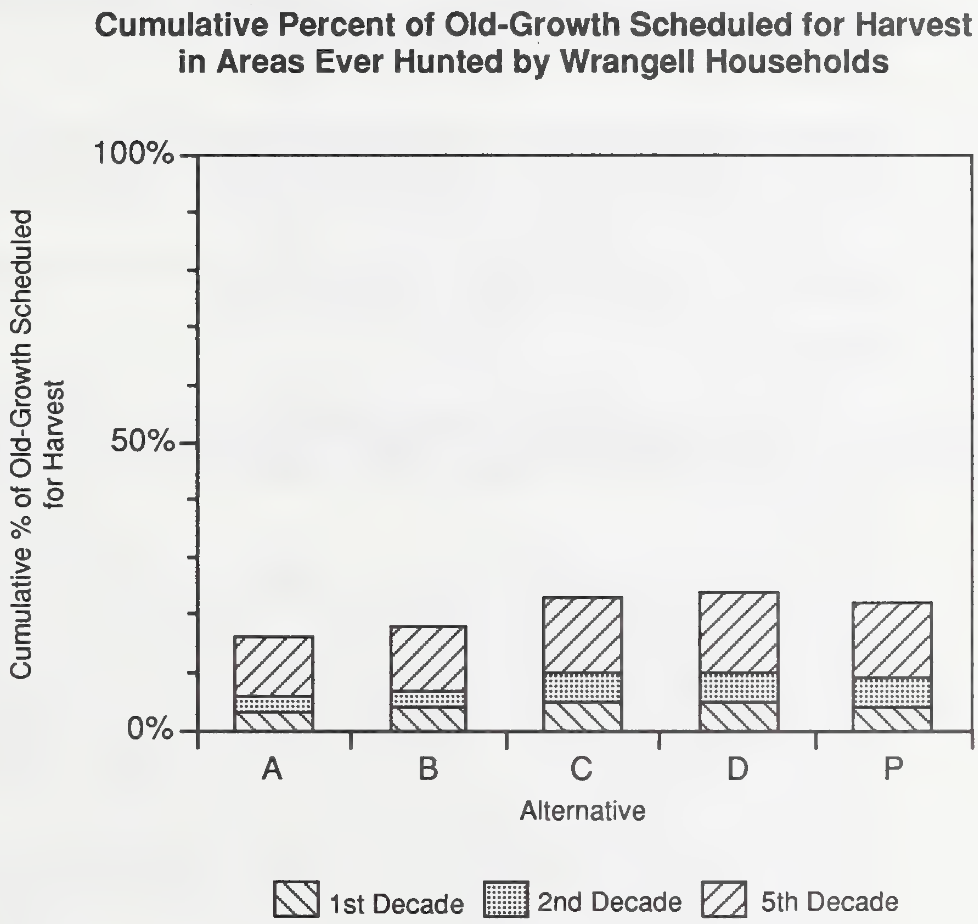
Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (20 WAA's). Analysis does not include those WAA's (113 WAA's) where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Figure 3-130 shows that no more than 24 percent of the existing old-growth in WAA's ever hunted by Wrangell households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Wrangell are allocated to natural setting land use designations in Alternatives A, B and D; and, Scenic Viewshed or Modified Landscape in Alternatives C and P.

Figure 3-130



Sources: 1988 Tongass Resource Cooperative Survey (TRUCS) database
Forest Service FORPLAN analysis, 6/91; A-D, P_PLNT_CM

Notes: The percent shown for decade 2 is the total combined harvest of decades 1 and 2.
Harvest for decade 5 is the total combined harvest for decades 1, 2, 3, 4, and 5 (50 years).

Yakutat

Yakutat is located on the mainland in extreme northern Southeast Alaska. Its population is 593; 58 percent of whom are Alaska Native.

Historically, Yakutat began as a Tlingit village site in the mid-1800's and has continued to be an important Native community. It has developed largely around the commercial fishing industry. Oil exploration caused a brief economic boom in the late 1970's. Timber harvesting in the 1980's increased Yakutat's population and employment. Tourism is an emergent, growing industry in Yakutat, especially since the 80 mile long Hubbard Glacier sealed off the Russell Fiord in 1986. Russell Fiord is no longer sealed off due to the failure of the ice dam blocking its entrance. However, should the Fiord close again, this could have profound effects on Yakutats economic and subsistence lifestyles.

Economy

The major employers of Yakutat are fisheries, fish processing, and government with retail trade and forestry being the other economic sectors. Most jobs other than governmental jobs are seasonal. The average per capita income for Yakutat is $9,000.

Subsistence is also an important part of Yakutat's economy with many Tlingits who depend upon the fish of the many surrounding rivers for their livelihoods.

Opinions

A number of Yakutat residents provided written comment on the issues for the Revision process and offered oral testimony on the 1990 DEIS. Those who commented were part of a sparse, non-random, self-selecting sample. Their comments do not necessarily reflect community opinion.

The City of Yakutat and the Yakutat Fishermen's Association requested that additional emphasis be placed on managing for scenic resources. While the Association is satisfied with current management emphasis on recreation, the City wants additional recreation emphasis. The City and the Yakutat Fish and Game Advisory Committee requested additional emphasis on fish resources. The City, Advisory Committee, and Association all want management to emphasize wildlife. The City and the Advisory Committee want additional emphasis on subsistence while the Fishermen's Association believe that current emphasis is adequate.

The City and the Fishermen's Association want the current timber sale program reduced and the long-term contracts terminated. Community residents were split in their opinion regarding timber harvesting with half wanting the same mix of emphasis and half wanting less timber harvesting. All three organizations requested no additional roads, log transfer facilities, or connections to existing roads. Yakutat is opposed to having the community connected to Canada by road. The City and Fishermen's Association are opposed to emphasizing mineral exploration and development. The City of Yakutat and the Fishermen's Association requested that additional areas be designated as Wilderness and that management emphasize tourism wildlife, recreation, and subsistence economic sectors. Residents are split with some wanting emphasis on recreation, tourism and fishing and others wanting a mix between these and commodity industries.

Subsistence and Recreation Use

Based on edible pounds harvested, salmon at 54 percent and finfish other than salmon at 19 percent are the most important subsistence resources for Yakutat households (Kruse and Frazier, 1988).

Appendix K provides detailed information about the areas that Yakutat households have ever used to hunt deer Summarizing, the majority of Yakutat households hunt deer in Wildlife Analysis Areas (WAA's) 4042, 4043, and 4054. These WAA's are roadless. As displayed on the Subsistence map, these areas are close to the community. Portions of these areas are also recreation places. In terms of number of deer harvested, the most successful deer hunting occurred in WAA's 3310 (9 deer) and 4256 (9 deer) (ADF&G, 1989). These WAA's are 11 and 0 percent accessible via existing roads (Appendix K).

Direct, Indirect and Cumulative Effects

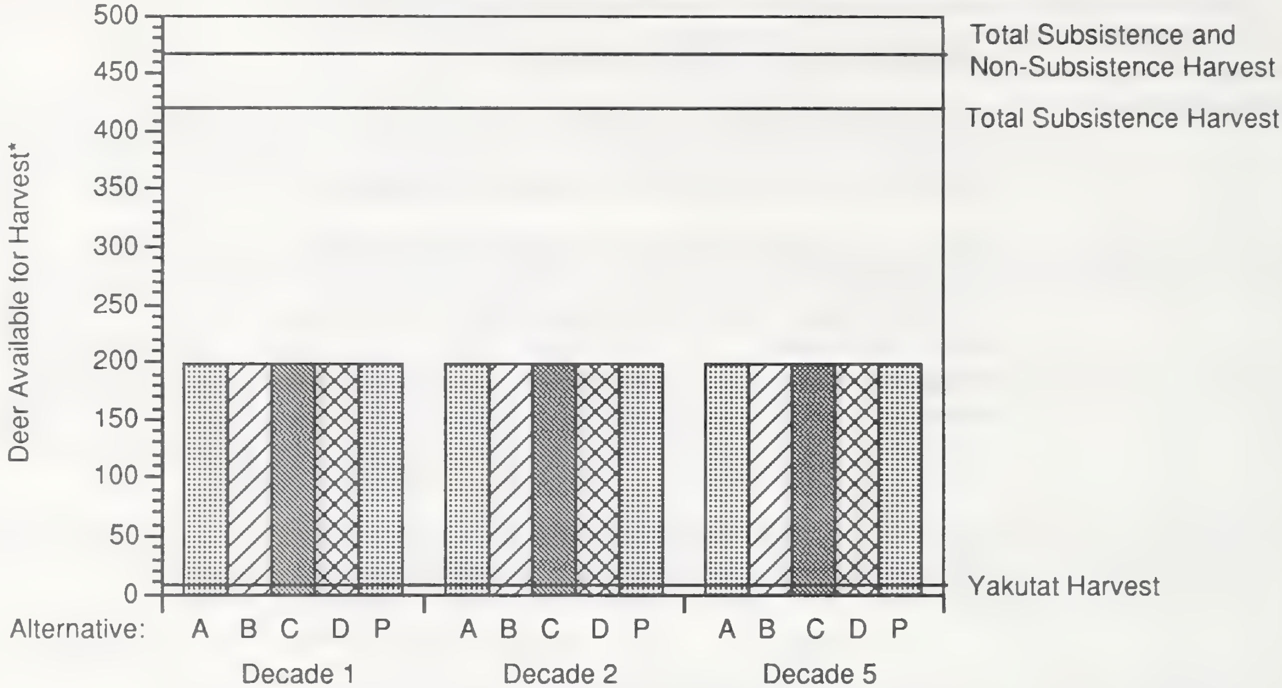
No significant decline in salmon, other finfish, or invertebrate habitat capability is expected from implementation of any alternative. This accounts for 82 percent of the total edible pounds of subsistence resources harvested by Yakutat households (Kruse and Frazier, 1988).

Figure 3-131 displays the abundance, distribution and competition for deer only for the WAA's where Yakutat hunters successfully harvested deer (2 WAA's). (This does not include every WAA where community residents have ever hunted deer, but only those WAA's where they actually harvested deer.) The predicted need for deer will be met for Yakutat hunters in each alternative for the next 50 years. However, the predicted need for deer for other subsistence, and non-subsistence hunters cannot be met by any alternative in any decade at 10 or 20 percent of the habitat capability. Deer accounts for a fraction of the total edible pounds of subsistence resources harvested by Yakutat households (Kruse and Frazier, 1988).

WAA's where Yakutat households successfully hunt deer (3310, 4256) are allocated primarily to land use designations that do not allow timber harvesting in all alternatives.

Figure 3-131

Deer Availability and Anticipated Harvest in Areas Used by Yakutat Households *



Sources: 1989 Deer Hunter Survey Statistics, ADF&G
Forest Service FORPLAN analysis, 6/91; A-D, P_Deer
1988 Tongass Resource Use Cooperative Survey database

*This analysis was conducted only for those WAA's from which community residents actually harvested deer (2 WAA's). Analysis does not include those WAA's where hunting occured but residents were unsuccessful. Deer available for harvest was calculated from 10 percent of the estimated deer habitat capability, as recommended by ADF&G.

Information about WAA's ever hunted by Yakutat residents is unavailable. Consequently, the cumulative percent of old growth scheduled to be harvested in WAA's ever hunted by Yakutat residents is unavailable. However, Appendix K shows that none of the existing old growth in WAA's successfully hunted by Yakutat households will be harvested in any alternative for the next 50 years.

The majority of recreation places near Yakutat are allocated to natural setting land use designations in all alternatives.

Effects of Forest Management of Private Property

Tracts of private land owned by Native Corporations adjacent to the Tongass National Forest support extensive timber harvest operations. Due to the large size of clearcutting operations and rate of timber harvest on these lands over the last ten years (primarily on North Chichagof, Kupreanof, Admiralty and Prince of Wales Islands, and mainland areas), old-growth associated wildlife habitat capability on the private land, especially deer, has declined and will continue to decline over the next two decades. Native-owned tracts of land are located in Alaska Department of Fish and Game Management Units 1A, 1C, 2, 3, 4 and 5. Consequently, lower deer density as well as density of other game species on private lands may increase demand for sport and subsistence hunting opportunities on adjacent National Forest lands.

Assuming that most remaining private timber will be removed within the next 10-12 years (USFS, Analysis of the Management Situation, ANSCA-Native Timber, 3-347, January, 1990), there will be a reduction in the amount of high volume old-growth habitats on these lands. Harvesting has occurred on lands around Kake, Hoonah, Cube Cove, Hobart Bay, Craig, Hollis, Klawock, Hydaburg, Metlakatla, and Yakutat. In the future, as second-growth stands mature, there will be a reduction in understory biomass (Alaback, 1984). The combination of a) reduction of forage; b) loss of high volume winter habitat; and c) poor juxtaposition of habitats will cause habitat capability to decline in the long term. Within 25 years, the mean winter capability is predicted to decline by about 50 percent on private lands (USFS, Ketchikan Pulp Company 1989-94 Operating Period FEIS, Section 4, page 218). As the clearcuts age and become less suitable for deer and other game species, hunters may move onto the National Forest, thereby increasing hunting pressure on the National Forest. This may lead to reduced hunter success and may lead to more restrictive bag limits or elimination of sport hunting to insure the Section 804 of ANILCA priority for subsistence users.

Availability and Alternative Actions

The Revision process is considering all federal lands contained within the Tongass National Forest. The availability of other lands which would be adequately suitable and available for the purpose sought to be achieved by this Environmental Impact Statement do not exist. Therefore there are no other lands available for consideration.

The Supplement considers five alternative actions for management of the Tongass National Forest. The alternatives presented are a depiction of a range of management considerations emphasizing some resources over others. The alternatives discussed constitute the "other alternatives" which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes.

Mitigation

The Revision considers mitigative measures (measures that will minimize impacts by limiting the degree or magnitude of an action and its implementation) for effects of proposed actions in all alternatives. The degree of mitigation varies in the amount of lands available for consideration of development activities by alternative. Each alternative is mitigated similarly by allowed activities directed by the Forest-wide Standards and Guidelines and Best Management Practices (BMP's) (see Proposed Revised Forest Plan). These guides meet the requirements for management of the National Forest System lands (36 CFR 219.27).

Variations in the amount of mitigation applied in each alternative, are caused by the allocation of specific land use designations: less development occurs in Alternative A, which emphasizes natural settings, and more development occurs in Alternative D, which emphasizes timber harvest and other development activities. Because subsistence use primarily involves the harvesting of fish and game, mitigation measures that protect or enhance fish and game resources will also protect and enhance subsistence activities.

Where the Timber Production, Modified Landscape, Scenic Viewshed and Minerals management prescriptions would normally be applied, fish habitat is maintained or improved in

each alternative through the application of riparian management prescriptions to all perennial streams and riparian areas. In land use designations such as Primitive Recreation, where management is normally less potentially impacting than could occur in a riparian management area, a riparian management prescription would not apply.

Water quality in Class I streams and Class II streams flowing directly into Class I streams would be protected through application of minimum 100-foot, no harvest buffers. Water quality in Class III streams would be protected through the application of Best Management Practices.

Mitigation to maintain and enhance deer habitat may be accomplished by several means. Examples are: a) following timber harvest, thinning to wider spacing is provided to allow greater forage production later in the age of the stand and b) allocating numerous important locations across the Forest to old-growth prescriptions as well as prescriptions not allowing development (i.e., Primitive Recreation, Beach Fringe, Research Natural Areas, Semi-primitive Recreation, etc.). Lands where the above prescriptions are applied have been removed from the timber harvest land base and provide the continuation of habitat into the next as well as future planning periods.

The Forest Service may control access on Forest Service constructed roads. Roads may be closed at the end of or during sale activities to limit vehicle access into hunting and fishing areas. Traffic control by road closure is effective if it is done quickly and in consultation with affected public. Once use of previously roadless areas becomes commonplace, road closures may be a potential source of significant impacts on subsistence gathering activities by limiting access.

A final mitigative measure is game harvest regulations. Regardless of the availability of habitat to support harvestable fish and wildlife populations, if overharvest occurs on a continuing basis, populations of these resources may be depleted. Appropriate seasons and bag limits are an integral part of fish and game management.

Cumulative Effects

Past Activities

The Revision DEIS displays the past, present and reasonably foreseeable effects on subsistence from development activities. Other sections of Chapter 3 discuss the cumulative effects of alternatives on all the resources. A summary of these sections is presented here.

Timber harvest has been perhaps more influential in changing the landscape than any other use of the resources. With timber harvest comes roading, log transfer facility development, crew camps ranging from a few years in duration to establishment of new towns, rock pits, and reductions in old-growth associated habitat. Between the turn of the twentieth century and the early 1950's, timber harvest averaged about 35 million board feet annually (or approximately 1,000 acres per year). Although relatively small amounts of timber were harvested during this period of time, most of this material came from high volume stands located along the coast (USFS, Analysis of the Management Situation, 1/90, Timber, page 3-340). Stands such as those harvested prior to 1950 along the coastal fringes of Southeast are today considered important wildlife habitat for overwintering herds of deer and for bald eagle nesting sites. Clearcut harvest of the better stands along the coast was at times accomplished by A-Frame and tractor type logging systems. For the most part however, single tree selection of the coastal fringe was the primary harvest system. Material harvested was used for mining, fish trap construction, and met part of the demand for airplane construction material during the war years. Between 1,000-1,300 acres of forested lands were converted to second-growth stands on an annual basis (USFS, Analysis of the Management Situation, 1/90, Timber, 3-346).

After the early 1950's, the long-term timber sale contracts emerged. Timber harvest since the mid-1950's has averaged approximately 352 million board feet per year (USFS, Analysis of the Management Situation, 1/90, Timber, page 3-342). Old-growth forested lands were converted to second-growth stands at a rate of approximately 9,000 acres per year. At present, approximately seven percent of the productive stands (volume greater than eight thousand board feet per acre) and about seven percent of the Forest has been roaded (USFS, Analysis of the Management Situation, 1/90, Roadless Area, pages 3-419 and 3-328).

In contrast to timber harvest, mining played an extensive agent of change in the early part of this century. Southeast Alaska has a long history of mineral prospecting and mining. The first mineral location in Southeast Alaska was recorded in 1867 by a Russian trader near New Kasaan on Prince of Wales Island. In 1880, gold was discovered in placer gravels near Juneau (USFS, Analysis of the Management Situation, 1/90, Minerals and Geology, page 3-174). This discovery sparked keen interest and by the turn of the century dozens of mines were in production from the Juneau Mining District to the Ketchikan Mining District. Mining remained quite active until World War II. From the close of World War II to the mid-1970's exploration and mineral production in Southeast compared to the activity documented at the beginning of the century remained low. Prospecting and exploration generally increased during the mid-1970's, in part due to the Quartz Hill and Greens Creek discoveries, improved metal prices, and deregulation of gold. Metal prices have continued to improve since the mid-1970's, resulting in increased exploration and renewed interest in precious metals, mainly gold.

Timber harvest associated with the mining activity is not, for the most part, visible today. Reductions in habitat capability as a result of mining are insignificant due to the small amount of acreage involved for waste and tailings disposal. Most ground disturbed by these activities has regenerated and grown stands of trees that are now 70-80 years old. Large tracts of land were harvested for the purposes of mine timbers and construction materials needed for the towns and tramways associated with the mines. Today, evidence of the activity is visible but limited due to the age of the second-growth timber stands that have engulfed the old workings. Of concern in many of the old sites are the tailings deposits which may continue to leach out heavy metals into surrounding streams and lakes.

Present Activities

Timber harvest since implementation of the 1979 Forest Plan including both the long and short-term timber sales harvest of net sawlog volume has averaged approximately 295 million board feet per year (Analysis of the Management Situation, 1/90, Timber, page 3-445). About 8,200 acres of old-growth productive forested lands have been converted to second growth each year (see Timber section of this chapter). Timber harvest of old-growth stands during Tongass Land Management Plan implementation has accounted for approximately two percent of the productive forest land base.

Approximately 100 miles of road has been constructed annually to access the timber harvested during this time period (USFS, Analysis of the Management Situation, 1/90, Transportation, page 3-517). Presently about thirty-four existing and functional log transfer sites are in use on the Forest; 44 additional log transfer sites are existing but in need of reconstruction if they are to be used again in the future.

Major mineral projects in differing stages of exploration and development on the Tongass during implementation of the existing Forest Plan include the Greens Creek Mine on Admiralty National Monument; Quartz Hill inside the boundaries of Misty Fiord National Monument; Kensington, located on the eastern shore of Lynn Canal; Jualin, located on the north shore of Berners Bay; and the Alaska/Juneau (AJ) located on City, State and Bureau of Land

Management lands in downtown Juneau. The Greens Creek Mine is the first of these projects to come on line and begin full-scale production. The Kensington and AJ mines have proposals for development and the Jualin mine is being explored for development. Should these projects begin development, as is the case with the Greens Creek venture, some impacts to the resources of the Tongass can be expected. Roads will be built to access mine facilities and water ports. Tailings as well as waste rock, can be expected to be deposited on the landscape. Water usage, sediment transfer, and an influx of personnel will be expected from each of the operations with potential for increases in competition. Localized effects on other resources can be expected in Wildlife Analysis Units 2202, 2408, 2410, 2514, 2515, 2517, 3837, and 822.

The Greens Creek Mine has affected surrounding resources to some degree. Due to some of the mitigation efforts which both the mineral development companies and the U.S. Forest Service sought to achieve, the public scoping process for the Revision did not indicate that subsistence use of these areas had been impacted. Examples of the types of mitigation that have aided in limiting impacts are: minimal camp and personnel on the site year-round, no hunting by company personnel on the site during work or off hours, monitoring of the amount of sediment and heavy metals in adjacent water systems, limiting vehicle use of roads to the mine from Hawk Inlet and from Hawk Inlet to Young Bay, and awareness of environmental concerns for the area to mitigate any unforeseen problems as they arise.

Similar mitigation during development of the other mine prospects in Southeast Alaska may aid in limiting the environmental pressures on the resources as well as use of the resources for subsistence purposes. Public awareness of the impacts associated with mining activities can aid in the safe development of future mineral prospects.

Because reporting acres of timber harvested on private land is not required, the exact acreage harvested by Native Corporations is not known. Due to the extensive harvesting of old-growth forests on these lands, in order to maintain well-distributed harvestable populations of game, surrounding forests on adjacent ownerships must be accounted for. Most Native inholdings are surrounded by National Forest System lands. These lands, if not previously harvested, must be taken into account for maintenance of viable populations on well-distributed basis (See Chapter 3, Wildlife). Native harvest has occurred in several areas on Chichagof, Kupreanof, Admiralty and Prince of Wales Islands and the mainland. The estimated acres of old-growth forests harvested on Native lands accounts for approximately 78,000 acres (USFS, Analysis of the Management Situation, 1/90, Timber, 3-461). Forest-wide this accounts for an estimated 1.3 percent of the old-growth productive land base.

Another significant occurrence since Tongass Land Management Plan implementation has been State land selections for the purpose of community development. Thorne Bay is an example. Established as a logging camp for timber harvest on the Ketchikan Pulp Company Long-Term Timber Sale Contract, Thorne Bay has become a recognized Southeast Alaska rural community surrounded by National Forest Lands. Historical use of the area indicates that this area had been used by other rural communities for subsistence gathering purposes (USFS, Tongass Resource Use Cooperative Survey, Draft Maps, 1988). Establishment of this permanent settlement has resulted in increased competition for the resources. The exact effect of this on subsistence resources is not clear. Although the present influx of people is relatively small, populations are expected to increase over time and create more competition for the resources adjacent to these communities.

Potential Future Impacts

The two long-term as well as the short-term timber sale contracts will have a decadal ceiling on the timber supply established by the selected alternative in the Record of Decision for the

Tongass Land Management Plan Revision. The range at which timber harvest may occur is discussed in the Timber section. The conversion of old-growth timber stands to second-growth stands affects the habitat capability for wildlife species such as deer, marten, brown bear and some species of birds (ptarmigan). If harvest continues on all sales at the rate it has occurred since implementation of the current Forest Plan, over the next ten years, 82,000 acres can be expected to be converted to second-growth (an additional 1.4 percent of the productive forest land base) and approximately 1,100 miles of additional road constructed (less than one percent of the Forest).

With timber harvest activities will come new access, a shift of existing camps or new camps, and utilization of the resources by other rural and non-rural residents. With this Revision and future revisions of the Forest Plan, habitat to meet viable populations of all game species on a well-distributed basis must be maintained. The allocation of fish and game will be the responsibility of the Federal Subsistence Advisory Board. This type of action, as prescribed by ANILCA Section 804, may be necessary to ensure the availability of adequate subsistence resources needed by the rural communities using the Tongass.

Native harvest of private lands is anticipated to decline to approximately 125 million board feet per year and be sustainable for the next 10-12 years (USFS, Analysis of the Management Situation, 1/90, Timber, page 3-437). This harvest will come primarily from Sealaska lands that have not been harvested to the same degree as other Native lands. Approximately 42,000 acres of productive old-growth forest lands (.7 percent of the productive forest lands Revision data base, 2/90) will be converted to second-growth stands. If land selections are initiated to acquire new lands previously unharvested, then additional acres can be expected to be converted and additional reductions in fish and wildlife habitat capability will likely result.

Mineral prices are highly variable in todays' market. If maintained or increased, then one or more of the mineral prospects currently being explored can be expected to be developed. These include, but are not limited to, the Kensington, Jualin, Greek Boy, AJ, and Herbert.

Summary of Findings

Section 810 of ANILCA (16 U.S.C. 3120) provides that in

> determining whether to withdraw reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease permit, or other use, occupancy or disposition of such lands which wold significantly restrict subsistence uses shall be effected until the head of such Federal agency:
>
> (1) gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to section 805;
>
> (2) give notice of, and holds, a hearing in the vicinity of the area involved; and
>
> (3) determines that (a) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (b) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (c) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

The Forest Plan is to guide the agency's management of the Tongass for ten to fifteen years and must provide two assurances. First, the Forest Plan must provide for multiple-use and sustained-yield of the products and services obtained in a way that maximizes long-term net public benefits in an environmentally acceptable manner. The Forest Plan must also include coordination of outdoor recreation, timber, watershed, wildlife and fish, and Wilderness (Multiple Use Sustained Yield Act of 1960). Second, in light of multiple-use and sustained-yield requirements, the Forest Plan must determine management systems, harvesting levels, and procedures (National Forest Management Act). More specifically, in approving a Forest Plan the Regional Forester makes decisions about:

- Forest wide management goals and objectives;
- Standards and guidelines for managing specific areas of the Forest;
- The suitability of land for Timber Production and an allowable timber sale quantity;
- Multiple-use allocations for roadless areas that are not recommended as potential Wilderness: and,
- Monitoring and evaluation requirements.

A decision approving a Forest Plan effectively zones what is and is not permissible in specific areas of the Forest. The Forest Plan does not commit the agency to individual activities or projects that are permissible under that zoning. Before the agency can commit to individual activities or projects that are permissible under a Forest Plan, it must conduct further analysis of those proposals as required by the National Environmental Policy Act. In short, areas that are made available for development by the Forest Plan do not constitute an irreversible and irretrievable commitment that mandates their development.

Because the Tongass Forest Plan does not approve any ground-disturbing activities to take place, there are no direct impacts on subsistence uses as a result of implementing any of the alternatives considered in this EIS. It is foreseeable, however, that if one of the alternatives considered in this EIS is adopted, that actions consistent with the land use allocations adopted in that alternative will take place under the umbrella of the Plan.

The analysis presented in this document is the cumulative effect of all activities that are permissible under the land use allocations adopted by each of the alternatives. The analysis conducted for subsistence uses addresses the effects of anticipated actions occurring under the alternatives considered in detail, effects of anticipated actions on subsistence uses and needs, availability of other lands for the purpose of management of the Tongass, and consideration of other alternatives which would reduce or eliminate development activities from land needed for subsistence.

In conducting the subsistence evaluation it is determined that, in combination with other past present and reasonably foreseeable future actions, none of the alternatives would pose a significant possibility of significant restriction for salmon, other finfish, marine mammals, invertebrates, plants, mountain goat, moose, waterfowl, seabirds, or other small game. Together, these resources account for an average of 79 percent of the total harvest of subsistence resources (Kruse and Muth, 1990).

In considering the impact of future actions that may take place under the proposed alternatives on deer, two types of analyses was conducted. Potential effects were first determined for those WAA's where residents have successfully harvested deer then for those WAA's where residents have ever gone to harvest deer. Both 10 percent and 20 percent harvest levels of the deer population were used.

Considering only those WAA's where residents successfully harvested deer and assuming a harvest level of 10 percent of the population, there would be sufficient deer in all alternatives for the next 50 years to meet all subsistence needs for all communities except Gustavus, Hoonah, Kake, Pelican, Sitka, and Yakutat (Appendix K). For these communities, there would be insufficient habitat capability to support harvest by all subsistence users (regardless of the community of origin). However, at 20 percent of the population, all subsistence needs for these communities would be meet by all alternatives for the next 50 years (Appendix K).

If instead of considering only those WAA's in which hunters were successful, we consider all WAA's ever hunted by community residents, then there would be sufficient deer habitat capability to support all subsistence hunters in the WAA's used for hunting by all subsistence communities except for Pelican and Gustavus. If instead of assuming a 10 percent harvest level, a 20 percent harvest level is used, there would be sufficient habitat capability to support all subsistence harvest in all WAA's used for hunting by all subsistence communities.

These impacts are not a result of any of the alternatives considered in the EIS however, but primarily the result of existing conditions (Table 3-248). For example, based on the 10 percent harvest level recommended by ADF&G the habitat capability existing in 1954 exceeded the recommended harvest rate in 31 WAA's (Table 3-247). As of 1990, 33 WAA's could not sustain current deer harvest levels assuming a 10 percent harvest rate on the residual deer population (Table 3.-247). At the end of the first decade of implementation of the Forest Plan, depending on alternative, an additional two to four WAA's would not meet projected demand for all users (subsistence and non-subsistence) (Table 3-246). At the end of the fifth decade, as compared to 1990, an additional five to nine WAA's would not meet demand depending on alternative. For ADF&G Game Management Units 1A, 1B, 2 and 3, deer habitat capability exceeds demand in all alternatives projected through the fifth decade of the Forest Plan (Table 3-248). In Game Management Units 1C and 4, demand exceeds capacity in the 5th and 15th decades for alternatives B, C, D, and P using a 10 percent harvest level but capacity exceeds demand in all alternatives through the 15th projected decade using a 20 percent harvest level (Table 3-248).

As a result of the analysis of the impacts of projects that would be permissible under each of the alternatives considered for adoption in the Forest Plan, it has been determined that all of the alternatives, if all permissible projects were fully implemented, have the potential to impact subsistence uses of deer, brown bear, and furbearers (specifically marten) due to potential effects of projects on abundance/distribution, and competition. Given the uncertainties associated with the data and the models used in this analysis and the uncertainties associated with projecting impacts fifty years into the future, it is difficult to say whether these impacts would rise to the level that they may significantly restrict subsistence uses of these resources. The information used and models are sufficient to indicate differences between alternatives and a reasoned choice among the alternatives presented.

Because of the potential for impacts resulting from permissible projects that may be implemented under the alternatives considered for adoption, the Forest Service will comply with the procedural requirements of section 810 of ANILCA. Public notice and hearings consistent with Section 810(a)(1-2) of ANILCA, will be held in the rural communities of Angoon, Cape Pole, Coffman Cove, Craig, Edna Bay, Elfin Cove, Gustavus, Haines, Hollis, Hoonah, Hydaburg, Hyder, Kake, Kasaan, Klawock, Klukwan, Metlakatla, Meyers Chuck, North Whale Pass, Pelican, Point Baker, Petersburg, Port Protection, Port Alexander, Saxman, Sitka, Skagway, Tenakee Springs, Thorne Bay, Wrangell, and Yakutat.

Notice and Hearings

Section 810(a)(1-2) of ANILCA requires the notification of appropriate state agencies, local communities, and regional councils and hearings in the vicinity of the affected area. The Forest Service will notify appropriate parties and hold hearings in the above referenced communities. Notification and hearings will be held either in coordination with or separate from the community meetings seeking public comment on the Supplement.

Preliminary Determination

Section 810(a)(3) of ANILCA requires that when a significant restriction may occur, determinations must be made in regard to whether:

- such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the National Forest lands;
- the proposed activity shall involve the minimum amount of National Forest Lands necessary to accomplish the purposes of such use and occupancy, or other disposition:
- reasonable steps shall be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

Necessity and Consistency with Sound Management of Public Lands

The alternatives proposed in the Tongass Land Management Plan Revision Supplemental Environmental Impact Statement have been examined to determine whether they are necessary and consistent with sound management of public lands. In this regard the National Forest Management Act of 1976, the Alaska National Interest Lands Conservation Act, the Alaska Regional Guide, the Tongass Land Management Plan, the Tongass Land Management Plan 1985-86 Amendment, the Alaska State Forest Practices Act, and the Alaska Coastal Zone Management Program have been considered.

Land management plans for the National Forests are required by the National Forest Management Act to provide for multiple-use and sustained-yield of the products and services obtained in accordance with the Multiple-Use Sustained-Yield Act of 1960, and, in particular, include coordination of outdoor recreation, timber, watershed, wildlife, fish, and Wilderness. Multiple use-is defined as "the management of all the various renewable resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people" 16 USC 531(a). The Tongass produces a wealth of resources, water, recreation, fish, timber, game, minerals, and others. The National Forest Management Act requires the Forest Service to find the balance that best meets the needs of all of the American people.

The Alaska National Interest Lands and Conservation Act placed an emphasis on the maintenance of subsistence resources and lifestyles. The Act also, however, required the Forest Service to make available for harvest 4.5 billion board feet of timber per decade from the Tongass National Forest. The Tongass Timber Reform Act removed this requirement from ANILCA, but directed the Forest Service to seek to meet market demand and the market demand for the planning cycle. Demand for timber from the Tongass National Forest is expected to remain near 400 million board feet per year from 1990 to 2010 (Table 3-120).

The alternative management plans presented here encompass five different visions of the mix of land uses that would produce the mix of resources that would best meet the needs of the American people. All of the alternatives involve some potential to impact subsistence uses on the Tongass. In order to best meet the needs of theAmerican people, it is necessary that a mix of resources be provided from the Tongass. Therefore, based on the analysis of the information

presented in this document on the proposed alternatives, these actions are necessary and consistent with the sound management of public lands.

Amount of Public Land Necessary to Accomplish the Proposed Action

The amount of land necessary to undertake the proposed action is, considering sound multiple-use management of public lands, the minimum necessary. The entire Tongass National Forest is used by one or more rural communities for subsistence purposes for deer hunting. The Subsistence Map indicates that the areas of most subsistence use are the areas adjacent to the existing road system, the beaches, and the areas in close proximity to the communities. Many of the management prescriptions protect the highest value subsistence areas. For example, Beach Fringe is one of the highest use subsistence areas and is fully protected by the beach fringe prescription and bald eagle nest tree buffers.

It is not possible to lessen harvest in one area and concentrate it in another without impacting one or more rural communities important subsistence use areas (see Subsistence Map in Map Packet). In addition, harvestable populations of game species could not be maintained in a natural distribution across the Forest if harvest were concentrated in specific areas. A well distributed population of species is also required by the Forest Service regulations implementing the National Forest Management Act.

Minimizing Adverse Impacts Upon Subsistence Uses and Resources. Impacts on subsistence have been minimized through development of the alternatives and standards and guidelines. During development of alternatives an effort was made to minimize activities that could adversely impact important subsistence use areas. The Forest-wide standards and guidelines and management prescriptions for the land use designations will be implemented as part of the action. Subsistence is addressed specifically in the Forest-wide standards and guidelines. The management prescriptions are designed to maintain fish and wildlife habitat productivity at the highest level possible, therefore, the impacts of the alternatives upon subsistence have been minimized.

FEIS Final Determination

The Record of Decision for the Final Environmental Impact Statement for the Revision will include a final determination about the significant possiblity of a significant restriction on subsistence uses that may result from implementation of the selected alternative. The final determination will revisit the above criteria and make final determinations on each of the categories considering further information obtained from hearings, public comments and other sources incorporated in preparation of the FEIS. The summary of the evaluation, findings and determinations will be contained in the Record of Decision.

Chapter 4

List of Preparers

Chapter 4

List of Preparers

Interdisciplinary Team - Core Team

Steven A. Brink

Tongass Land Management Plan Revision Team Leader (2/89 - present)

Contributions made

Responsible for the public participation and coordination activiities required, and the preparation of the Environmental Impact Statement and other associated documents, leading to the Revision of the Tongass National Forest Land Management Plan.

Responsible for consistency with NFMA and NEPA and other applicable laws and regulations.

Education

B.S. Civil Engineering, University of California, Davis 1971

Forest Service: 22 years

Land Management Planning, Regional Office, Juneau, AK, 2 years

Land Management Planning and Transportation Engineering Staffs, Washington, D.C., 1 year

Transportation Engineering Staff, Regional Office, San Francisco, CA, 2 years

Engineering and Aviation Management Staff Officer, Chatham Area, Tongass NF, 4 years

Logging Systems Specialist, Stanislaus NF, 3 years

Transportation Planner, Six Rivers NF, 4 years

Sanitation Engineer, Inyo NF, 1 year

Transportation Engineer, Eldorado NF, 5 years

4 List of Preparers

David Arrasmith

Economist/Analyst

Contributions made

Economic analysis

FORPLAN analysis

Education

B.S. Agricultural Economics, University of California Davis, 1981

Forest Service: 9 years

Economist/Analyst Alaska Region, 2 years

Economist/Sociologist Eldorado National Forest, 7 years

Norene Blair

Writer-Editor

Contributions made

Writer/editor

Resource Analyst

Desktop publisher

Education

B.A. Planning and Administration, University of Oregon, 1968

M.A. Planning and Administration, University of Oregon, 1970

M.S. Forest Management (Silviculture), University of Idaho, 1977

Pre-doctoral Studies, Forest Entomology, University of Idaho

Forest Service: 15 years

Writer-Editor TLMP Revision Team, December 1988 - present.

Writer-Editor, Supplemental EIS, Alaska Pulp Corporation Long-term Sale Contract (SEIS)

Land Use Coordination, Columbia River Gorge National Scenic Area

Writer/Editor/Indexer - Detailer - Ochoco, Siskiyou, and Malheur NF, 2 years

Forester, Sale Planner/Logging Systems Specialist, Malheur NF, 2 years

Environmental Coordinator, Burns Ranger District, 3 years

Forester/Data Base Specialist, Planning Team, Malheur NF, 4 years

Other relevant employment

Resource Economics Instructional Assistant, University of Idaho, 2 years

Forrest Cole

Timber/Subsistence Coordinator (5/89-present)

Contributions made

Timber and Subsistence

Juneau/Admiralty Timber & Lands Layers, GIS.

Education

B.S. Forestry, Northern Arizona University.

Forest Engineering Institute

Forest Service: 17 years

Timber/Subsistence Coordinator, TLMP Revision, 4/89 - Present

Timber, Lands, Minerals Staff, Juneau Ranger District, TNF, 1983-1989

Small Sales Forester, Petersburg RD Tongass National Forest, 1980-1983

Presale Forester, APC Long-term Sale, Petersburg RD, Tongass National Forest, 1979-1980

Presale Forester, Coconino National Forest, Region 3, 1977-1979

Fire Control, Coconino NF, 1971-1977

John Day

FORPLAN Analyst

Contributions made

FORPLAN modelling

FORPLAN analysis

Education

B.S. Forest Management, Colorado State University

M.S. Operations Research/Forestry, Colorado State University

Forest Service: 3.5 years

FORPLAN analyst, R10-RO, 1.5 years

TM/LMP Systems Section, Washington Office (Detached), Ft. Collins, Colorado, 2 years

4 List of Preparers

Ron Freeman

Forester; Support specialist on TLMP

Contributions made

Writing and editing of roadless area evaluations; editing Wilderness AMS, Stikine Area.

Rewriting and organizing Recreation chapter.

Education

B.S. in Forestry, Outdoor Recreation, University of Washington, 1976

Forest Service: 13 years

Recreation Staff, Stikine Area, Tongass NF, 2 years

Resources Forester, Randle Ranger District, Gifford Pinchot NF, 9 years

Forestry Technician, Oakridge Ranger District, Willamette NF, 2 years

Details to: Wenatchee NF(White Pass Ski Area EIS), Mount St. Helens National Volcanic Monument (Rec Staff), Hells Canyon NRA (Recreation Planning)

Other relevant employment

Seasonal employment with National Park Service and Forest Service

Eugene J. DeGayner

Resource Information Manager

Contributions made

Coordinate GIS activities

Oversee the development of a forest-wide data base for the Revision

Education

B.S. Wildlife Biology, University of Minnesota, 1980

M.S. Wildlife Biology, University of Minnesota, 1982

Forest Service: 6 years

Wildlife Biologist, Tongass National Forest, Ketchikan Area, 6 years

Donald K. Golnick — **Forester (4/91-present)**

Contributions made

Timber

Education

B.S. Forestry (Hydrology emphasis), University of Minnesota, 1973

Forest Engineering Institute, Oregon State University, 1977

Forest Ecology and Silviculture (CEFES VII), University of Montana, University of Idaho, and Washington State University, 1985

Forest Service: 17 years

Certified Silviculturist, Alaska Region (pending)

Certified Silviculturist, Pacific Southwest Region, Plumas National Forest, Oroville Ranger District, 11 years

Timber Management Assistant, Pacific Southwest Region, Six Rivers National Forest, Mad River Ranger District, 2 years

Sale Planner, Pacific Southwest Region, Six Rivers National, Mad River National Forest, 2 years

Rick Griffen — **GIS Database Administrator and Analyst**

Contributions made

GIS database management and analysis

Education

B.S., M.S. Wildlife Management; Humboldt State University, 1983.

Forest Service: 4 years

Jane Hurst — **Computer Programer Analyst**

Contributions made

Desktop publishing and some editing

Forest Service: 9 years

Computer Programer Analyst, Management Services, Alaska Region, June 1991-present

Secretary, Tongass Land Management Planning Team, .5 year

Computer Assistant, Ketchikan Area, 3.5 years

Management Assistant, Alaska Region, 5 years

Steven Kessler

Fish Biologist

Contributions made

Summarized fish habitat situation on the Tongass, and evaluated consequences of the alternatives on fish.

Participated in the development of the Forest-wide GIS database.

Coordinated development of Land Use Prescriptions, Forest-wide Standards and Guidelines, and Monitoring Plan.

Managed public scoping database, and analyzed public comments.

Education

B.S. Biological Sciences, University of Arizona, 1974

M.S. Ecology and Evolutionary Biology, University of Arizona, 1978

Forest Service: 11 years

Fish Biologist, Tongass NF, Tongass Forest Plan Revision Interdisciplinary Team, Juneau, Alaska, 1987-present

Forest Fish Biologist, Wenatchee National Forest, 4 years

Fish Biologist, Tongass National Forest, Chatham Area, Juneau Ranger District, Yakutat Work Center, 2 years

Fish Biologist, Tongass National Forest, Chatham Area SO, 1 year

Other relevant employment

Planner, Alaska Department of Fish and Game, FRED Division (on IPA assignment from Forest Service to ADF&G), 1982

Fish Technician, USDI, Bureau of Land Management, Boise, Idaho, Summer 1979

Hydrology Technician, USDI Bureau of Land Management, Worland, Wyoming, Summer 1978

Research and Teaching Assistant, University of Arizona, 1975-1978

Instructor, Pima Community College, Tucson, Arizona, 1977-79

Connie G. Myers

Public Affairs Specialist/Social Scientist

Contributions made

Develop and implement programs to inform and involve individuals, groups, and government agencies in the Tongass Land Management Plan Revision. Analyze effects of alternative management activities on the social environment and on subsistence hunting, fishing, trapping, and gathering activities.

Education

B.S. Natural Resources Management, University of Tennessee at Martin, 1981

M.S. Fisheries and Wildlife, Michigan State University, 1985

M.S. Communication, Michigan State University, 1985

Forest Service: 6 years

Public Affairs Specialist/Social Scientist, Forest Plan Revision Team, 4 years

Social Scientist, Ketchikan Area, 1 year

Subsistence Specialist, Ketchikan Area, 1 year

Other relevant employment

Fisheries and Wildlife Internship Coordinator, Michigan State University, 4 years

Teaching Assistant, University of Tennessee at Martin, 1 year

Park Technician, US Army Corps of Engineers, 2 years

Park Naturalist, Tennessee State Parks, 1 year

John Neary

Outdoor Recreation Planner

Contributions made

Wild and Scenic Rivers Suitability for Supplement

Education

BS Outdoor Recreation, Colorado State University, 1982

Forest Service: 9 years

Admiralty National Monument, Backcountry Management, 8 years

ROS Planning, Chatham SO, 1 year

Other relevant employment

US Peace Corps, Rwanda Africa, Recreation Management, 1 year

Colorado State Parks, various positions, seasonal

4 List of Preparers

Mark L. Orme

Wildlife Biologist

Contributions made

Coordinated and compiled wildlife habitat and population information for the Revision.

Coordinated the development of Research Natural Area and Experimental Forest proposals for the Revision.

Compiled the habitat and population information for threatened and endangered and sensitive species.

Compiled the old-growth forest information for the Revision.

Compiled the biological diversity information for the Revision.

Education

BS Forestry, University of Idaho, 1971

MS Wildlife Management, University of Idaho, 1975

Forest Service: 14.5 years

Wildlife Biologist, Region 10, 4 years

Wildlife Biologist, Targhee NF, 6 years

Wildlife Biologist, Idaho Panhandle NF, 3 years

Forestry Technician, Clearwater NF, 1 year

Hydrologic Technician, Clearwater NF, 6 months

Other relevant employment

Research Associate, University of Idaho, 2 years

Biological Technician, Idaho Department of Fish and Game, 2 years

Bruce Rene

Natural Resource Planner

Contributions made

Provide guidance on and facilitate: 1) the documentation of the National Forest Management Act planning process, and 2) the analysis and documentation required by the National Environmental Policy Act.

Education

B.A., Humanities, Shimer College 1967

M.A., English, University of Kentucky, 1970

MBA, Business Administration, University of Texas, 1976

Forest Service: 13 years

Documents Coordinator, 2 years

Assistant Forest Planner & Environmental Coordinator, Stanislaus NF, 11 years

Lance H. Tyler

Recreation Planner, Regional Office, R-10

Contributions made

Roadless Area Analysis

Wild & Scenic Rivers Analysis

Education

B.A. International Relations, Political Science and Economics, 1967

M.S. Recreation Resources, Colorado State University, 1977

Forest Service: 14 years

Outdoor Recreation Planner, Arapaho and Roosevelt National Forests, 12 years

Tongass Land Management Planning Team, 1.5 years

Assisted in original development of the Recreation Opportunity Spectrum.

IDT member for Forest Plan development.

Developed Cache La Pondre Wild or Scenic River Study.

Recreation and visual group leader for Two Forks Reservoir EIS, South Platte River.

Leader for Recreation Settings task group for National Recreation Strategy.

Other relevant employment

Supervised university contract for development of State Comprehensive Outdoor Recreation Plan (SCORP) for Colorado 1976

U.S. Department of State 1967-1975, Washington D.C., Taiwan, Hong Kong

Bill Wilson

Timber Planner (1987-5/89)

Contributions made

Timber analysis

Education

B.S. Forestry, McNeese State University, 1968

Forest Service: 22 Years

Revision IDT Member, Tongass National Forest, (1987-Present)

Regional Office Timber Planner, Alaska Region, 7 years

District and Supervisors Office Timber Assistant, Lincoln NF, 3 years

District Timber Assistant, Kiabab NF, 1 year

Supervisors Office Timber Assistant, Prescott NF, 4 years

Inventory Forester, Southern Forest Experiment Station, 3 years

Forestry Aid, Mt. Hood NF, 1 year

Interdisciplinary Team - Extended Team

Robert C. Aiken — **Transportation Planner**

Contributions made

Coordinated transportation and facilities input, including log haul costs, future road density estimates, log transfer facility inventory, and facility needs.

Education

B.S. Forest Engineering, Oregon State University, 1980

Forest Service: 9 years

Transportation Planner, Tongass National Forest, Stikine Area, 1984-present

Forester, Siuslaw National Forest, 1980-84

Other relevant employment

Cooperative Education Student, Siuslaw National Forest, 2 years

Forestry Aid, Siskiyou National Forest, 2 seasons

John T. Autrey — **Archaeologist**

Contributions made

Cultural Resource Management

Education

B.A. Anthropology, University of Northern Colorado 1973

M.A. Anthropology, University of Northern Colorado 1973

Forest Service: 9 years

Ketchikan Area, Tongass National Forest, R10, Area Archaeologist, 1987-Present

Kaibab National Forest, R-3, Assistant Forest Archaeologist, 3 years

Chatham Area, Tongass National Forest, R10, Archaeological Technician, 2 years

Deirdre P. Buschmann — **Landscape Architect**

Contributions made

Visual Resource Analysis

Education

Bachelor of Landscape Architecture, University of Washington, 1980

Forest Service: 10 years

Forest Landscape Architect, Tongass NF, Stikine Area, July 1985 to Present

Landscape Architect, Tongass NF, Stikine Area, 4 years

Engineering Draftsman, Tongass NF, Stikine Area, 5 months

John J. Kato

Mining Geologist

Contributions made

Mineral Resource Analysis

Education

BA, Geology, California State University - Humboldt,1975

BS, Geological Oceanography, California State University - Humboldt, 1975

Forest Service: 7 years

Zone Mining Geologist - Administration of minerals & geology programs. Chatham and Stikine Areas, Tongass NF, 1985-present

Physical Science Technician, Six Rivers NF, Summers of 1973-75. Worked on rock pit designation, design, and layout.

Other Relevant Employment

U.S. Bureau of Land Management, Geological Oceanographer, Environmental Assessment Staff, New York Outer Continental Shelf Office, New York City, NY, 1976-77

U.S. Bureau of Land Management, Area Geologist, Yukon Resource Area, Fairbanks District Office, Fairbanks, AK, 1977-80

U.S. Bureau of Land Management, Area Geologist - Fortymile Resource Area, Fairbanks District Office, Tok, AK, 1980-83

U.S. Bureau of Land Management, Area Manager, Fortymile Resource Area, Fairbanks District Office, Tok, AK, 1983-84

U.S. Bureau of Land Management, Area Geologist, Glennallen Resource Area, Anchorage District Office, Glennallen, AK, 1984-85

4 List of Preparers

David Loggy

Professional Certified Soil Scientist

Contributions made

Team member covering watershed and air resources

Established watershed and air standard and guidelines.

Municipal Watershed prescription

Established wetland identification, classification and delineation.

Watershed input into riparian prescriptions

Watershed and air sections of AMS

Education

AA degree, Casper Junior College, 1961

B.S. Range Conservation, Colorado State University, 1966

Certified Professional Soil Scientist since 1977

Forest Service: 24 years

Soil Scientist, Tongass National Forest, Ketchikan Area, 18 years

Soil Scientist, San Juan National Forest, Supervisor's Office, 7 years

Range Technician, Wallowa-Whitman, 1/2 year

Range Aid, Medicine Bow National Forest, Thunder Basin National Grassland, 1/2 year

Roy Mask

Entomologist, Alaska Region, State and Private Forestry, Forest Pest Management

Contributions made

Coordinated Fire, Rural Development and Forest Pest Management input.

Education

B.S. Forestry, Forest Recreation Management, Stephen F. Austin State University, 1980

M.S. Forestry, Forest Entomology/Forest Recreation Management, Stephen F. Austin State University, 1982

Forest Service: 9 years

Entomologist, Alaska Region, State and Private Forestry, Forest Pest Management, October 1990 to Present

Presale Forester, Harney RD, Black Hills NF, 1 year

Presale Forester, Elk Mountain RD, Black Hills NF, 2 years

Coordinator, Timber Shared Services, South Zone, Bighorn NF, 2 years

Forester Presale/Silviculture, Buffalo RD, Bighorn NF, 2 years

Forestry Technician, Range/Wildlife/Recreation, Trinity RD, Davy Crockett NF, 1.5 years

John Morrell

Lands Specialist

Contributions made

Lands analysis

Law enforcement input

Education

B.S. Forestry, University of Montana, Missoula, 1967

M.S. Forestry, California State University, Humboldt, 1976

Master of Forest Resources, University of Washington, 1977

Forest Service: 13 years

Lands Forester, Tongass NF, Chatham Area, 4 years

Resource Assistant, Thorne Bay RD, 2 years

Resource Assistant, North Prince of Wales RD, 2 years

Forester/Recreation Assistant, Packwood RD, 2 years

Forester, Packwood RD, 1 year

Forestry Technician, Packwood RD, 3 months

Other relevant employment

Research Assistant, University of Washington/PNW Experiment Station, 1.5 years

Recreation Technician, BLM, Ukiah, CA, 3 months

Other Contributors

James F. Baichtal

Forest Geologist

Contributions made

Blue River Lava Flow and North Prince of Wales and Dall Island Karst Special Areas and Standard and Guidelines for Cave Resource Management.

Education

Associate Science Degree, LCC, Longview, WA, 1977

Bachelor of Science in Geology, Washington State University, 1980

Master of Science in Geology, Washington State University, 1982

Thesis topic: Geology of Waldron, Bare, and Skipjack Islands, San Juan County, Washington.

Forest Service Employment: 7 years

Forest Geologist, Ketchikan Area, Tongass National Forest, July 1990-Present

Cave resources in Central Oregon on the Deschutes National Forest. Member, National Speleological Society and the Glacier Grotto in Alaska.

Resource Geologist, Umpqua NF, Roseburg, OR, 2.5 years

Engineering Geologist, Ochoco NF, Prineville, OR, 3.5+ years

Engineering Geologist, U.S. Army Corps of Engineers, Ft. Worth, TX, 1.5 years

Physical Science Aid, Snoqualmie NF, Naches, WA, summers of 1978/79.

Instructor, Geology, Local Community Colleges. Instructor, geology field camp, two summers for Paleontology Lab, Washington State University

Detail White Sands Missile Range for 6 weeks in 1986 to the COE to head up a large drilling foundation investigation.

Detailed to the Wallowa-Whitman NF for 2 weeks in 1987 to head Forest personnel with rock source management and foundation design for a boat landing in Hells Canyon.

Other relevant employment

Operated a Geologic Consulting business in and around Roseburg, Oregon.

Randy Coleman

Regional Monitoring Coordinator

Contributions made

Assisted in preparing the monitoring plan

Education

B.A., Psychology, University of Michigan, 1975

Master of Public Policy, University of Michigan, 1980

Forest Service: 8/90-Present

R10 Monitoring Coordinator

Other relevant employment

Legislative Analyst, U.S. Office of Management and Budget (covering USDA and the Department of the Interior), 1980-1990

Nida Crumley

Geographic Information System Technician

Contributions made

Digitize, data editing

Forest Service: 3.5 years

GIS Technician, Tongass NF, Chatham Area, 1 year

Computer Clerk, Tongass NF, Chatham Area, 1 year

Cartographic Aid, Tongass NF, Chatham Area, 1.5 years

Karen Dillman

Biological Technician (Plants)

Contributions made

Data Display and Analysis for Wildlife, Biological Diversity and Old Growth

Education

A.A.S degree Forestry 1981

A.A.S. Forestry - currently a student at University of Alaska-Southeast

Forest Service: 7 years

Biological Technician on the Stikine Area working with Plant Association project, 1 year

Forestry Technician on the Petersburg Ranger District

Forestry Technician on the Medford Ranger District, Chequamegon NF, Region 9

Helped compile data for Wildlife, Old Growth analysis (1989)

Other relevant employment

Smithsonian Institute, Museum of Natural History, Department of Botany, Washington D.C. Data input from herbarium collection of specimens from French Guianas and speciman curation.

U.S. Peace Corps, Ecuador, South America - reforestation projects, teaching conservation and agroforestry practices

4 List of Preparers

Walter A. Dortch

Planning Staff Officer

Contributions made

Coordination of Area reviews of Standards and Guidelines

Education

B.A., History, Indiana University, 1976

B.A., Political Science, Indiana University, 1976

B.S., Forestry, Oregon State University, 1981

Forest Service: 10 years

Planning Staff Officer, Ketchikan Area, 1.5 years

Assistant Lands and Minerals Staff, Mt. Baker-Snoqualmie NF, 4.5 years

Forester, Timber Management, Darrington RD, Mt. Baker-Snoqualmie NF, 4 years

Maria S. Dudzak

Planning Assistant

Contributions made

Graphics, charts and tables

Writer/Editor

Documents management (DATALIB)

Education

B.S., Geography, University of California, Davis, 1985

Forest Service: 4 years

Hydrologist, Ketchikan Area, 1 year

Planning Assistant, Tongass NF, 1 year

Secretary, Forestry Sciences Laboratory, Juneau, Alaska, 1 year

Forest Guide, Tongass NF, 2 years

Other relevant employment

Cartographic Technician, USDA Soil Conservation Service, 1985

Geologic Aide, Bureau of Land Management, 1984

Dick Estelle

Planning Staff Officer - Stikine Area

Contributions made

Assist in coordination of IDT activities with the Stikine Area Management Team

Assist IDT in formulating procedures and processes

Education

B.S. Horticulture, Landscape Construction & Maintenance, Oregon State University, 1969

Forest Service: 22 years

Planning Specialist, Stikine Area, Tongass NF, 12 years

Forest Landscape Architect, Stikine Area, Tongass NF, 5 years

Forest Landscape Architect, Kootenai NF, 4 years

Assistant Landscape Architect, Siuslaw NF, 1 year

Other relevant employment

Grade school and high school teacher, Alaska, 1965-66

Theodore W. Falkner

GIS Coordinator, Chatham Area, Tongass NF

Education

Humboldt State, Forestry, 1956-60

Humboldt State, Civil Engineering, 1960-62

LA State, Los Angeles, Civil Engineering, 1964-66

Forest Service: 30 years

Transportation Planning, Small Data Base Design and Maintenance, GIS Coordination, Tongass NF, 1982-Present

Transporation Planner and Logging Engineer, Klamath NF 12 years

Transportation Planner, Logging Engineer, Sequoia NF, 4 years

Survey Technician, Design Engineer, Angeles NF, 4 years

Survey Technician, Klamath NF, 4 years

4 List of Preparers

Don Fisher

Recreation Group Leader, Ketchikan Area, Tongass NF

Contributions made

Suitability study for Wild and Scenic Rivers

Education

Bachelor of Landscape Architecture, University of Georgia, 1972

Forest Service: 13 years

Recreation Group Leader, Supervisor's Office, Ketchikan Area, Tongass NF (Recreation Planning), 7/90-Present

Recreation and Interpretive Services Program Manager, Pisgah RD, Pisgah NF, NF's in North Carolina (Recreation Planning) , 10 years

Recreation Planner/Landscape Architect Supervisor's Office, Chatham Area, Tongass NF, 2 years

Other Relevant Employment

Recreation Planner, US Army Corps of Engineers, Mobile District, Mobile Alabama, 1 year

Landscape Architect/Recreation Planner, Atlantic Division Naval Facilities Engineering Command, Norfolk, Virginia, 1.5 years

Landscape Architect/Recreation Planner, D'Angelo Associates, Planners and Engnneers, Atlanta, Georgia, 4 years

Michael E. Fox

Planning Assistant, Chatham Area

Contributions made

Prepared roadless area evaluations and Wild and Scenic River tentative eligibility determinations.

Education

B. S., Forest Management, Utah State University

Forest Service: 18 years

Planning Assistant, Tongass NF, Chatham Area, 2 years

Forester, Malheur NF, 9 years

Forester, Klamath NF, 2 years

Forester, Kaibab NF, 2 years

Forestry Technician, Deschutes NF, 1 year

Forestry Technician, Stanislaus NF, 2 years

Other relevant employment

Forester, U.S.A.C.E., Ft. Worth Engineering District, 3 years

Susan Gorder

Engineering Technician

Contributions made

Database assistance

Education

A.A., Engineering Technology, 1982

Forest Service: 5 years

Chatham Area, GIS, Information Systems Management

Geneen Granger

Detailer for Roadless Areas, Wild and Scenic Rivers, Editing

Contributions made

Contributed to the writing, editing, and preparation for publication of Appendices C and E; edited other appendices and chapters of the DEIS.

Education

B.A. Anthropology, University of California, Davis, 1973

MLIS, University of California, Berkeley, 1987

Forest Service: 2 years

Writer/Editor, Tongass NF, Ketchikan Area

Other relevant employment

Research Librarian, University of California, Davis

Charlotte Greenfield

Computer Programmer Analyst, GIS

Contributions made

Computer programming and analysis.

Forest Service: 13 years

GIS Computer Analyst, Stikine Area, Tongass NF, 3 years

Computer Programmer, Stikine Area, Tongass NF, 6 years

Draftsman, Planning, Stikine Area, Tongass NF, 4 years

Other relevant employment

Title Searcher, Safêco Title Insurance, Eugene, Oregon.

4 List of Preparers

Jim Llanos

GIS Computer Assistant

Contributions made

Updates to Existing Ketchikan Area Data

Create new GIS data related to TTRA of October 1990

Create new GIS data for Ketchikan Area related to TLMP

Education

Systems and Procedures, Development and Design, National Career Institute, San Francisco, CA

Forest Service: 1 Year

Computer Assistant, Ketchikan Area, Tongass NF

Other relevant employment:

Administrative Officer, Union Bank

Research and Development, Federal Home Loan Bank Association, San Francisco, CA

Virginia Lutz

GIS Technician

Contributions made

ARC/INFO User, Data-Editing

Education

B.A., Biology, Southwest State University, Minnesota, 1982

Forest Service: 2 years

GIS Technician, Tongass NF, Chatham Area, 1 year

Computer Clerk, Tongass NF, Chatham Area, 1 year

Marti M. Marshall

Recreation Specialist/Planner

Education

B.A. Multidisciplinary Social Sciences, Michigan State University, 1976

Forest Service Employment : 13 years

Recreation Specialist, Tongass National Forest, Chatham Area, 3 years

Recreation Technician, Tongass National Forest, Juneau RD, 2 years

Recreation Technician, Mt. Hood National Forest, Columbia Gorge RD, 8 years

Mary Beth Nelson

Recreation Planner, Chatham Area

Contributions made

Coordinated development of GIS Data Base for Recreation, Lands and Archaeology, prepared Roadless Area evaluation.

Education

B.S. Recreation Area Management, Montana State University, 1979

Forest Service: 9 years

Recreation Planner, Chatham Area, Tongass NF, Sitka, Alaska, 3 years

Architectural Technician, Chatham Area, Tongass NF, Sitka, Alaska, 4 years

Architectural Technician, Kootenai NF, 2 years

Alaska Pulp Corp. Long-Term Timber Sale Contract Final Supplemental EIS 1981-86 and 86-90, 1986-90 Appeals, Final EIS 1986-90, Admiralty Island National Monument Proposed Boundary Change Final EIS, Recreation Opportunity Spectrum Inventory.

Other Relevant Employment.

Employment outside the Forest Service.

Steve J. Paustian

Area Hydrologist

Contributions made

Development of Riparian and Stream Standards and Guides, Soil and Water Best Management Practices, Fisheries Habitat Models.

Education

B.S. Watershed Management, Colorado State University, 1974

M.S. Forest Hydrology, Oregon State University, 1977

Forest Service: 13 years

Chatham Area Hydrologist, Sitka Alaska, 13 years

Other relevant employment

Research Assistant, Water Quality, Oregon State University, 2 years

4 List of Preparers

William H. Pawuk — **Stikine Area Ecologist**

Contributions made

Suitability write-ups for Wild and Scenic Rivers for the Stikine Area, Tongass NF

Education

B.S. Forestry, 1964

M.S. Plant Pathology, 1967

Ph.d. Botany, 1971

Forest Service: 20 years

Stikine Area Ecologist, 3 years

Nursery Manager, B. Frank Heintzleman Nursery, Petersburg, Alaska, 7 years

Research Plant Pathologist, Southern Forest Experiment Station, Pineville, Louisiana, 5 years

Plant Pathologist, Southern Area, Forest Pest Management, Pineville, Louisiana, 5 years

Terese Rockne — **GIS Technician**

Contributions made

Editing, digitizing. Development of process to automate wild and scenic rivers for GIS.

Education

B.S. Secondary Education/Health, 1986

Forest Service: 3.5 years

GIS Technician, Stikine Area, Tongass NF

Jim Schramek — **GIS Coordinator (Stikine Area)**

Education

B.S. Forestry, University of Minnesota, 1971

M.S. Forest Hydrology, University of Minnesota, 1977

Forest Service: 12 years

GIS Coordinator, Stikine Area, 2 years

Planner, Stikine Area, 5 years

Hydrologist, Stikine Area, 5 years

John C. Sherrod

Planning Staff Officer, Chatham Area Management Team Representative

Contributions made

Coordination of the TLMP planning with the Chatham Area

Task force for development of the Forest Monitoring Plan

Assisted IDT in formulating procedures and processes.

Education

B.S. Forestry, University of Georgia, 1960

M.S. Forest Resources, University of Idaho, 1980

Forest Service: 29 years

Planning Staff Officer on the Helena, Chugach, and Tongass National Forests, 13 years

Planning Team Leader on the Custer, Gallatin, and Willamette National Forests, 6 years

Ranger District assignments on four Districts on the Colville and Custer National Forests, 10 years

John Short

Forest Landscape Architect, Ketchikan Are

Contributions made

Directed and helped implement recreation place, recreation site, and trail inventory, and directed its input into ARC/INFO data base. Implemented visual resource inventory for Ketchikan Area and directed its input into ARC/INFO data base. Assisted in developing Roadless inventory and Roadless Area descriptions. Assisted in reviewig and commenting on drafts of visual and recreation resource standards and guidelines. Assisted Forest staff in reviewing and commenting on alternatives. Assisted in revising Roadless chapter for supplemental draft.

Education

B.S., Journalism, minor in Landscape Architecture, Cornell University, 1967

M.L.A, Landscape Architecture, Cornell University, 1975

Forest Service: 14 years

Forest Landscape Architect, Ketchikan Area. Involved in visual resource management, timber sale planning, visual and recreation inventories, recreation planning, recreation site planning.

Other relevant employment

Landscape architect with City Planning Department, Ithaca, NY, 1975, 6 months

4 List of Preparers

Barbara A. Stanley

Recreation and Lands Forester, Ketchikan Ranger District

Contributions made

Coordinated Wild and Scenic Rivers input for the Ketchikan Area. Prepared river descriptions and maps for Appendix E.

Education

B. Music, Keyboard Performance, 1970

M.S. in Natural Resource Management, 1973

Forest Service: 9 years

Recreation and Lands Forester; developed recreation, special uses, and lands, 3 years

Forestry Technician in Rec and Lands

Recreation Planner, Arapaho and Roosevelt NF; Recreation Research Technician, Southeastern Forest Experiment Station.

Other relevant employment

Recreation Research Technician, Purdue University/Indiana Department of Natural Resources. Planned statewide trail system and evaluated streams for potential inclusion in National Wild and Scenic River System.

Loreen Trummer

Forester

Contributions made

Assisted with wildlife data entry

Education

BS in Timber Management, University of Wisconsin-Stevens Point, 1989

Forest Service: 4 years

Pre-sale forester at the Petersburg Ranger District, 4 years

Robert G. Varner

Forest GIS Coordinator, R-6 Gifford Pinchot NF

Contributions made

Assisted as a 2-month detailer in the preparation of map products, developed and updated new and existing resource data layers for incorporation into the Forest-wide GIS database.

Education

B.S. Logging Engineering, Oregon State University, 1980

Forest Service: 11 years

Forest GIS Coordinator, R-6 Gifford Pinchot NF, 2 years

Forest Transporation Planner, R-6 Gifford Pinchot NF

Area Transportation Planner, R-10, Ketchikan Area, Tongass NF, 3 years

District Logging Engineer & Sale Adminiatrator, R-5 Mendocino NF, 5 years

Other relevant employment

Forestry Tech, BLM-Oregon, 4 summers

Andrew E. Wilson

GIS database analyst, Stikine Area

Contributions made

GIS analysis

Education

B.S., University of Idaho, 1983

M.S., University of Washington, 1989

Forest Service: 8 years

GIS database analyst, analysing GIS data at Stikine Area, 1 year

Natural Resources Analyst, Olympic NF

Database analyst, Natural Resources analyst

Chapter 5

Agencies, Organizations, and Individuals to whom Copies of this Supplement Were Sent

Chapter 5

Agencies, Organizations and Individuals to Whom Copies of the Documents Were Sent

Individuals Sent Copies of the DEIS Supplement

Ben F. Williams
Bob L. Hunter
Charles A. Yates
Chester R. & Margaret Mattson
Ciel Sander
Dave Dunaway
David & Paula Rak
David C. Williamson
Donald Wilcox
Douglas Spink
Dr. David E. Johnson
Dr. H. Richard Carlson
Gary Gillette
Helen Clough
John C. Crouse, M.D.
John C. Welden
John H. Brillhart
Kelly McCracken
Kenneth St. Mary
L. S. Wright
Paul S. Glavinovich
Pete Smith
R.J. Gordon
Richard A. Lamb
Richard J. Gordon
Susan Domenowske
V. L. Rudolph
Walter Shuham
William T. Messmer
Anita Scott
Arnold & Carolyn Keskulla
Brent Anderson
Harold Dobsch
Jeffrey H. Reeves
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Marion Amdursky
Mark Lusch
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Patricia A. Henry
Patrick Simmons
Philip Simon
Ralph Stevens
Ralph Wells
Raymond Spencer
Rhonda Jean Bedard
Robert Cozby
Robert Croteau
Ron Rue
Ross Shearer, Jr.
Steven Manns
T. F. Smith
Ted Scherff
Terry D. Mehlman
Terry Morgenroth
Theodore Bailey

5 Agencies, Organizations and Individuals

Camille and John Holzheimer
Carol Bradford-Goble
Carolyn Orsi
Charles E. McLeod, Sr.
Cliff Lobaugh
Denny O'Neal
Dianna Brown
Don Branham
Douglas Dempnock
Douglas Tweet
E. L. Hunsaker III
E. William Gates
Ellet Hoke
Everett Loucks
Frank & Penny Starr
Franklin D. & Ella Cooper-Waldron
Gary A. Roberts
Glen Price
Gordon J. Rollman
Jose Barbosa
Don Madsen
Donald C. Lyon
Donald J. Walsh
Donald K. Merila
Ed West
Edward C. Hamilton
Garrett K. Buffa
Gayle L. Hammons
Graham Wright
Hugh Dilbeck
John Carpenter
John Kessler
John L. Hall
John Rupe
John Spurney
Julia M. McLean
Kenneth Sanchez
Kent Bovee
Kristen C. Newberg
Larry Dietrick
Mark J. Kirchhoff
Michael Klauer
Michael Sukey
Michael Welsh
Mike & Karin O'Brien
Mr. Jacob W. Pratt, Jr.
Mrs Raymond Williamson
Nathan Borson
Patrick Tierney
R. C. Bloom
Randall Jahnke
Richard Schroeder
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Chapter 7

Glossary

Chapter 7

Glossary

These definitions apply to Forest Service land management and planning. Meanings may differ when used in another context. Glossary definitions are not legal unless otherwise noted. Definitions were shortened, paraphrased or adapted to fit local conditions and for ease of understanding.

A

Access The opportunity to approach, enter, and make use of public lands.

Access management Acquiring rights and developing and maintaining facilities needed by people to get to and move through public lands (physical attributes).

Active channel Unstable portion of a stream where stream channels are frequently changing course.

Adfluvial fish Species or populations of fish that do not go to sea, but live in lakes, and enter streams to spawn.

Adjudicate To settle in the exercise of judicial authority. To determine finally (Black. 1979, Black's Law Dictionary).

Aggradation The process of building up a land surface by deposition.

AHMU Aquatic Habitat Management Unit.

AHRS See Alaska Heritage Resource Survey.

Airshed Geographical areas which, because of topography, meteorology, and climatic conditions, share the same air mass. Air is managed by airshed.

Alaska Heritage Resource Survey (AHRS) The official list of cultural resources in the State of Alaska, maintained by the Office of History and Archaeology, Alaska Division of Parks and Outdoor Recreation.

Allowable Sale Quantity (ASQ) The maximum quantity of timber that may be sold in each decade from suitable scheduled lands covered by the Forest Plan.

Alluvial fan A cone-shaped deposit of organic and mineral material made by a stream where it runs out onto a level plain or meets a slower stream.

Alluvium Recent soil deposits resulting from modern rivers, including the sediment laid down in river beds, flood plains, lakes, and at the foot of mountain slopes and estuaries.

Alpine Parts of mountains above tree growth and/or the organisms living there.

7 Glossary

Alternative One of several options proposed for decision making.

Ambient air That air, external to buildings, encompassing or surrounding a specific region.

Ambient Air Quality Standard The prescribed level of pollutants in the outside air that cannot be exceeded legally during a specified time in a specified geographical area.

Amenity Resource use, object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value typically describes those resource properties for which monetary values (or market values) are not or cannot be established.

Anadromous fish Fish which mature and spend much of their adult life in the ocean, returning to inland waters to spawn. Salmon and steelhead are examples.

Analysis area An area of land which has the same timber management costs and responses to timber management activities.

ANCSA The Alaska Native Claims Settlement Act of December 18, 1971. Public Law 92-203, 92nd Congress, 85 Stat. 688-716.

ANILCA The Alaska National Interest Lands Conservation Act of December 2, 1980. Public Law 96-487, 96th Congress, 94 Stat. 2371-2551.

Appropriate suppression action The planned strategy for suppression action (in terms of kind, amount, and timing) on a wildfire which most efficiently meets fire management direction under current and expected burning conditions.

- **Critical protection** Areas where human life or habitation are present have priority over all others. Immediate and continuous efforts are made to minimize loss of life and damage to property.
- **Full protection** Valuable resources, such as commercial timber stands and historic structures exist; however, no human life or habitation exist in these areas. Immediate and aggressive action is taken to limit the number of acres burned.
- **Modified action** Uninhabited; with resources of lesser value. Land managers consider tradeoff of acres burned versus suppression expenses. Fires during critical burning months are attacked, but a lower level of protection is provided when the risks of large, damaging fires is less.
- **Limited action** Areas where the cost of fighting the fire is greater than the fire damage. Suppression efforts are limited to keeping a fire within a designated area or protecting critical sites within the areas.

Appropriation of land The act of selecting, devoting, or setting apart land for a particular use or purpose, such as appropriating land for public buildings and military reservations or other public uses (Black, 1979).

Aquaculture Maintaining, enhancing, and rehabilitating fish stocks through improvements and facilities, including the rearing of anadromous juvenile fish, generally in fresh water, for release into salt water for maturing, to become available as a common property resource.

Aquatic ecosystem A stream channel, lake or estuary bed, the water itself, and the biotic communities that occur therein.

Aquatic farm (or Aquafarming) - Growing, farming, or cultivating aquatic products in captivity or under positive control. Current State of Alaska law (AS 16.40.100 - 16.40.199, July 1, 1990), does not allow the aquatic farming of finfish, but does allow the farming of shellfish.

ARC/INFO — ARC/INFO is the name of the Geographic Information System (GIS) software used for the Revision database.

Area of potential effects — The geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist.

Arterial road — Roads usually developed and operated for long-term land and resource management purposes and constant service.

Associated grave goods — The items placed with human remains at the time of interment.

ASQ — See Allowable Sale Quantity.

Atmospheric dispersion — The lofting and distribution of particulate matter from wood smoke into the atmosphere over time.

B

Background — The distant part of a landscape. The seen, or viewed, area located from three or five miles to infinity from the viewer. (See "Foreground" and "Middleground".)

Beachlog salvage — The salvage of logs that have been washed-up on beaches. Special provisions in ANILCA allow beachlog salvage in Wilderness and National Monuments if it can be conducted without roads or use of vehicles on uplands.

Bedload — Sand, silt, and gravel, or soil and rock debris rolled along the bottom of a stream by the moving water. The particles of this material have a density or grain size which prevents movement far above or for a long distance out of contact with the streambed under natural flow conditions.

Benchmark — An analysis of the supply potential of a particular resource, or set of resources, subject to specific management objectives or constraints. Benchmarks define the limits within which alternatives can be formulated.

Best Management Practices (BMP's) — Land management methods, measures or practices intended to minimize or reduce water pollution. Usually BMP's are applied as a system of practices rather than a single practice. BMP's are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

Biological diversity — The distribution and abundance of different plant and animal communities and species within the area covered by a land management plan.

Biological potential — The maximum possible output of a given resource limited only by its inherent physical and biological characteristics.

Biomass — The total quantity, at a given time, of living organisms of one or more species per unit area or all of the species in a community.

Blowdown — See windthrow.

BMP's — See Best Management Practices.

Board foot — A unit of timber measurement equaling the amount of wood contained in an unfinished board 1 inch thick, 12 inches long and 12 inches wide.

7 Glossary

Bole	Trunk of the tree. A tree stem once it has grown to substantial thickness—roughly to that capable of yielding poles, sawlogs, or veneer logs.
Boulders	Rounded or angular rocks greater than 12 inches in size.
Braided streams or channels	A stream flowing in several dividing and reuniting channels resembling the strands of a braid, the cause of division being the obstruction by sediment deposited by the stream.
BTU	British thermal unit. The quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

C

Canopy gap	Openings created in second growth conifer stands by cutting all of the trees in a small area to maintain or increase the number of understory plant species.
Capability	The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity.
Capital investment cost	Costs generally associated with construction such as trails, roads, and physical structures.
Cave	Cave is legally defined under federal law as "any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or human-made. Such term shall include any natural pit, sinkhole or other feature which is an extension of the surface," (Federal Cave Resource Protection Act of 1988). Speleologists use "cave" to refer to all parts, regardless of size, of an underground system that links openings and chambers and that may connect the system to the surface. Included in the term caves are tree molds and lava tubes associated with lava flows, erosional caves, and those formed by dissolution of bedrock.
CFL	See Commercial forest land.
CFR	Code of Federal Regulations.
Channel	A passage, either naturally or artificially created, which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. River, creek, run, branch, and tributary are some of the terms used to describe natural channels. Natural channels may be single or braided. Canal and floodway are some of the terms used to describe artificial channels.
Channel migration	Movement of a stream or river channel within a floodplain area usually over an extended period of time.
Channel type	A means of distinguishing parts of a stream system into segments which have fairly consistent physical and biological characteristics. For descriptions, see "Channel Type Field Guide," Publication R10-MB-6.
Claim	To demand as one's own or as one's right; to assert; to urge; to insist (Black 1979).
Class (streams)	See Stream class.
Class II area (Air)	Geographic area having air quality exceeding the National Ambient Air Quality Standards,

which is designated for a moderate degree of protection from future air quality degradation. Moderate increases in new pollution may be permitted.

Clearance — Cultural resources: Certification by the Forest Supervisor documenting that the requirements of 36 CFR 800 have been fully met for each undertaking.

Clearcut — Harvesting method in which all trees are cleared in one cut. It prepares the area for a new, even-aged stand. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded as a separate age class in planning.

CMAI — See Culmination Mean Annual Increment.

Coarse gravel — Rounded rocks generally 3/4 of an inch to 3 inches in size.

Cobbles — Rounded rocks between 3 and 12 inches in size.

Colluvial — Soil and material produced by the disintegration and weathering of rocks, including cliff debris, material of avalanches, and alluvium. This material accumulates at the foot of a slope.

Commercial forest land (CFL) — Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; and (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting.

Commodities — Resources with monetary (market) or commercial value; all resource products which are articles of commerce, such as timber and minerals.

Common variety — Deposits of sand, stone, gravel, and others of widespread occurrence not having distinct special value. These deposits are used generally for construction and decorative purposes and are disposed of under the Materials Act of 1947.

Confined streams — Streams that are confined within their channel banks; controlled by stream incision, geomorphic landform characteristics, and local geological conditions.

Confluence — The point where two streams meet.

Convey — To pass or transmit the title to property from one to another (Black 1979).

Conveyance — An instrument by which some estate or interest in lands is transferred from one person to another (Black 1979).

Corridor — A linear strip of land defined for the present or future location of transportation or utility rights-of-way within its boundaries. Also, connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat.

Cost Efficiency — The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values, but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.

Created opening — Openings in the Forest canopy created by silvicultural practices including shelterwood regeneration cutting, clearcutting, seed tree cutting, or group selection cutting.

Critical habitat	Specific terrain within the geographical area occupied by threatened or endangered species, on which are found those physical and biological features that are essential to conservation of the species and which may require special management considerations or protection.
Crown	The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.
Cull logs	Trees that do not meet certain quality specifications.
Culmination Mean Annual Increment (CMAI)	The point at which at tree (or stand) achieves its highest average growth, based on expected growth according to the management intensities and utilization standards assumed in the Forest Plan.
Cultural descendant	A person who, although not necessarily a direct descendant of a particular deceased person, is associated with a cultural religious tradition to which the human remains of the deceased person has significance.
Cultural resources	The physical remains of districts, sites, structures, buildings, networks, events, or objects used by humans in the past. They may be historic, prehistoric, architectural, or archival in nature. Cultural resources are non-renewable aspects of our national heritage.
Cumulative effects	See Effects.
Cumulative watershed effects (CWE)	The effects on a watershed's streams and lakes which result from the incremental impact of individual actions within a watershed when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative watershed effects can result from individually minor but collectively significant actions taking place over a period of time.

D

DBH	See Diameter at Breast Height.
Dead	A standing tree that is completely dead. May be in various stages of decay.
Debris flows	The movement of material resulting from the decay and disintegration of rocks, earth, and other materials.
Debris slides	The rapid downslope movement of a mixture of soil, rock, and forest litter with or without a relatively high water content. Also known as debris avalanches.
Debris torrents	Landslides that occur as a result of debris; avalanche materials which either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris. Debris torrents are usually confined within the stream channel until they reach the valley floor where the debris spreads out, inundating vegetation and forming a broad surface deposit.
Decision criteria	The rules or standards used to evaluate alternatives. They are measurements or indicators that are designed to assist a decision maker in identifying a preferred choice from an array of possible alternatives.
Decks	Cut timber, sawlogs, or cull logs that have been removed from logging units and stacked.
Degradation	The general lowering of the surface of the land by erosive processes, especially by the removal of material through erosion and transportation by flowing water.

Demand The amount of goods or services that will be consumed if offered over a given range of prices at a particular point in time.

Demographic Pertaining to the study of the characteristics of human populations, such as size, growth, density, distribution, and vital statistics.

Departure A timber harvest level that cannot be continued at that level forever.

Detrimental soil disturbance The condition where established threshold values soil properties are exceeded and result in significant change or impairment. (See also, Significant change and Significant impairment.)

Detritis Material, produced by the disintegration and weathering of rocks, that has been moved from its site of origin.

Developed recreation That type of recreation that occurs where modifications (improvements) enhance recreation opportunities and accommodate intensive recreation activities in a defined area.

Diameter at Breast Height (DBH) The diameter of a standing tree at a point four feet, six inches from ground level.

Digitize The act of placing spatial information into a computer.

Discharge velocity The speed of water outflow from a stream or river over a given period of time .

Discount rate The rate used to adjust future benefits or costs to their present value.

Dispersed recreation That type of recreation use that requires few, if any, improvements and may occur over a wide area. This type of recreation involves activities related to roads, trails and undeveloped waterways and beaches. The activities do not necessarily take place on or adjacent to a road, trail, or waterway, only in conjunction with it. Activities are often day-use oriented and include hunting, fishing, boating, off-road vehicle use, hiking, and among others.

Dispersion To disperse the effects of timber harvest by distributing harvest units more or less uniformly throughout a drainage so that increased runoff and sediment from disturbed sites will be buffered by lower levels of runoff and sediment production from surrounding undisturbed lands.

Dissected landforms A physical, recognizable form or feature of the earth's surface such as a mountain, hill, or valley, having a characteristic shape, that in part is the result of several shallow or deeply incised drainage channels.

Dissolved oxygen The amount of free (not chemically combined) oxygen in water.

Distance zone Areas of landscapes denoted by specified distances from the observer (foreground, middle-ground, or background). Used as a frame of reference in which to discuss landscape characteristics of management activities.

Diversity The distribution and abundance of different plant and animal communities and species within the area controlled by the Forest Plan.

Down A tree or portion of a tree which is dead and laying on the ground.

Draft Environmental Impact Statement (DEIS) The version of the statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA) and released to the public and other agencies for review and comment. It is a formal document which must follow the requirements of NEPA, the Council on Environmental Quality (CEQ) Guidelines, and directives of the agency responsible for the project proposal. (See also Environmental Impact Statement.)

Duff layer — The general term for vegetation material covering the mineral soils in forests including the fresh litter and well-decomposed organic material and humus.

Dust, fugitive or Fugitive dust — Particulate matter composed primarily of soil which is uncontaminated by industrial activities. Examples are emissions from haul roads and wind erosion.

Dying — A standing tree partially dead above ground and likely to die in the future.

E

Ecosystem — A complete, interacting system of organisms considered together with their environment (for example; a marsh, a watershed, or a lake).

Ecotone — A transition or junction zone between two or more naturally occurring diverse plant communities (ecosystems).

Ecotype — A species of plant or animal that displays different genetic or physiological adaptations. For example, the brown bear in Southeast Alaska is the same species as the grizzly bear in interior Alaska, but the brown bear is smaller than the grizzly.

Effect — In Cultural Resources, the potential of an undertaking to alter the characteristics that may qualify a property for inclusion in the National Register of Historic Places.

Effects

- **Direct** — Results of an action occurring when and where that action takes place.
- **Indirect** — Results of an action occurring at a location other than where the action takes place and/or later in time, but in the reasonably foreseeable future.
- **Cumulative** — Results of collective past, present, and reasonably foreseeable future actions.

EIS — See Environmental Impact Statement.

Emergent — A plant rooted in shallow water and having most of its vegetation above water (cattails).

Encumbrance — A claim, lien, charge, or liability attached to and binding real property (Black 1979).

Endangered species — Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1978 Endangered Species Act.

Enhance — To improve, reinforce, enrich or strengthen the existing condition, value, or beauty of a resource.

Entitlement — Right to benefits, income or property which may not be abridged without due process (Black 1979).

Environmental analysis — An analysis of alternative actions and their predictable short- and long-term environmental effects, incorporating the physical, biological, economic, social and environmental design arts and their interactions.

Environmental Impact Statement (EIS) — A document prepared by a federal agency in which anticipated environmental effects of a planned course of action or development are evaluated. A federal statute (Section 102 of the National Environmental Policy Act of 1969) requires that such statements be prepared. It is prepared first in draft or review form, and then in a final form. An impact statement includes

the following points: (1) the environmental impact of the proposed action, (2) any adverse impacts which cannot be avoided by the action, (3) the alternative courses of actions, (4) the relationships between local short-term use of the human environment and the maintenance and enhancement of long-term productivity, and (5) a description of the irreversible and irretrievable commitment of resources which would occur if the action were accomplished.

Ephemeral channels A stream that flows in direct response to rainfall and snowmelt but not during dry seasons. Its channel is above the level of the water table.

Equipment fires Those wildfires originating from the use of equipment in forest operations such as logging, yarding, chainsaws, land clearing, road building, etc.

Erosion The wearing away of the land surface by running water, wind, ice, gravity or other geological activities.

Escapement Adult anadromous fish that escape from all causes of mortality (natural or human-caused) to return to streams to spawn.

Estuarine Deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land, but have open, partly obstructed or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.

Evaluation The analysis and interpretation of information collected through monitoring.

EVC See Existing Visual Condition.

Evapotranspiration The sum total of water lost from the land by evaporation and plant transpiration. Transpiration is loss of water in vapor form from a plant.

Even-aged management The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. The difference in age between trees in forming the main canopy level of a stand usually does not exceed 20 percent of that age of the stand at harvest rotation age. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Executive Order An order or regulation issued by the President or some administrative authority under his direction.

Existing data search A systematic check and evaluation of available records, documents, and informant sources to gather information pertinent to cultural resources within a given area.

Existing Visual Condition (EVC) EVC ratings are established to give the land manager an indication of the current level of visual quality and visual evidence of management activities. EVC classes are as follows:

- **Type 1** Appears to be untouched by human activities, except for trails needed for access; only ecological changes have occurred.
- **Type 2** Changes in the landscape are not noticed unless pointed out.
- **Type 3** Changes in the landscape are noticed as minor disturbances, but the natural appearance of the landscape remains dominant.
- **Type 4** Changes in the landscape are easily noticed and perceived as disturbances, but resemble natural patterns.
- **Type 5** Changes stand out as a dominant impression on the landscape, yet are shaped to resemble natural patterns from 3-5 miles or more distant.

Type 6	Changes are in glaring contrast to the landscape's natural appearance; excessive visual alteration has occurred.

F

Facility	Structures needed to support the management, protection, and utilization of the National Forests, including buildings, utility systems, dams, and other construction features. There are three types of facilities: recreation, administrative, and permitted.
Fire Management Action Plan	A plan which provides detailed information for, and guides the implementation of, fire manage ment activities for the approved alternative for the Forest Plan.
Fire severity	How hot a fire is for how long. The hotter a fire is and the longer it burns, the more severe it is.
Fire suppression	All the work of extinguishing or confining a fire, beginning with its discovery.
Fiscal Year (FY)	October 1 to September 30. The Fiscal Year is referred to by the calender year which begins on January 1. For example, October 1, 1991, to September 30, 1992, is referred to as Fiscal Year 1992.
Fish User Day (FUD)	A recreation visitor day spent fishing or viewing fish.
Flash flooding	A very rapid responding, relatively high streamflow overtopping the banks in any reach of a stream.
Floodplain	That portion of a river valley, adjacent to the river channel, which is covered with water when the river overflows its banks at flood stages.
Fluvial	Of, or pertaining to, streams and rivers.
Foodfish	Fish consumed by humans.
Footslope	The inner, gently inclined surface at the base of a hill or mountain slope. The surface profile is dominantly concave, and is the transition zone between upslope erosional sites and downslope depositional sites.
Forbs	A grouping/category of herbaceous plants which are not included in the grass, shrub or tree groupings/categories; generally smaller flowering plants.
Foreground	A term used in visual management to describe the stand of trees immediately adjacent to a scenic area, recreation facility or forest highway. The area is located less than 1/4 mile from the viewer. (See Background and Middleground.)
Forest Development Transportation Plan	The plan for the system of access roads, trails, and airfields needed for the protection, administration, and utilization of the National Forests and other lands administered by the Forest Service, or the development and use of resources upon which communities within or adjacent to the National Forests are dependent (36 CFR 212.1).
Forest Facility Master Plan	The plan which depicts the development and management of the Forest's facilities. This includes current volume of business and projections for the future, locations for needed skills to perform program work, existing administrative sites and proposed locations of new sites, and management strategies concerning consolidation or sharing services between units (FSM 7312.1).

Forest health	A condition where biotic and abiotic influences on the forest (i.e., insects, diseases, atmospheric deposition, silvicultural treatments, harvesting practices) do not threaten management objectives for a given forest unit now or in the future.
Forest Plan	Source of management direction for an individual Forest specifying activity and output levels for a period of 10-15 years. Management direction in the plan is based on the issues identified at the time of the plan's development.
Forested land	Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use.
Forested wetland	A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.
Forest-wide Standards and Guidelines	Establish the environmental quality, natural renewable and depletable resource requirements, conservation potential, and mitigation measures that apply to several land use designations.
FORPLAN	The forest planning model. A linear programming software package used to analyze planning decisions regarding land use patterns, capital investment, and timber harvest scheduling.
FSH	Forest Service Handbook.
FSM	Forest Service Manual.
FUD	See Fish User Day.
Fuel	The organic materials that will support the start and spread of a fire: duff, litter, grass, weeds, forbs, brush, trees, dead woody materials.
Fuel loading	The volume of the available or burnable fuels in a specified area.
FY	See Fiscal Year.

G

Genetic descendant	A person known or reliably assumed to have a genetic relationship to a deceased person.
Glacial refugia	The areas of Southeast Alaska that were not covered by glaciers during the last ice age.
Glacial rivers and streams	Rivers and streams that receive their main flow characteristics from the presence and activities of ice and glaciers and their meltwater.
Glide or placid streams	Grouping of channel types (L1 and L2) that have fairly consistent physical characteristics occurring on lowland landforms and are mostly associated with bogs, marshes, or lakes.
Goal	A concise statement that describes a desired future condition normally expressed in broad, general terms that are timeless, in that there is no specific date by which to goal is to be achieved.
Goods and services	The various outputs and on-site uses produced from forest resources.
Groundwater	Water within the earth that supplies wells and springs. Specifically, water in the zone of saturation where all openings in soils and rocks are filled; the upper surface level forms the water table.
Group Selection	A harvesting method in which trees are removed in small groups at a time.

Guideline An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard, which is mandatory.)

Guyline circle Guylines are cables to brace the tower (spar) used in cable logging systems. Using the tower as the center, the guyline circle is the area between the tower and where the guylines are anchored. For safety reasons, this area is usually cleared of all trees.

H

Habitat The sum total of environmental conditions of a specific place occupied by a wildlife or plant species or a population of each species.

Hard snags/soft snags Terminology used to described the state of the decay process in dead trees. Hard snags are dead trees which have little decay and are generally still hard wood. Soft snags are dead trees which have a considerable amount of decay and are generally soft, broken wood.

Haul out Areas of land used by marine mammals for resting and other social/biological activities which occur out of the water.

Historic property Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. The term includes artifacts, records, and remains that are related to and located within such properties.

Human remains The physical remains of human bodies.

Humus Substance of organic origin that is fairly but not entirely resistant to further bacterial decay.

Hydrologic cycle The complete cycle through which water passes, commencing as atmospheric water vapor, passing into liquid and solid form as precipitation, thence along or into the ground surface, and finally again returning to the form of atmospheric water vapor by means of evaporation and transpiration. Also called Water Cycle.

Hydrophyte Plants typically found in wet habitats.

I

IDT See Interdisciplinary Team.

Ignition The initiation of combustion.

Implementation For cultural resources, that point in an undertaking when the proponent has full and complete authorization to proceed with the undertaking.

Infrastructure The facilities, utilities, and transportation systems needed to meet public and administrative needs.

Inherent capability Recreation capability for the physical, social and managerial setting for recreation, based on remoteness from modern human development and activity, modification of the land, and social factors such as crowding.

Integrated Pest A process for selecting strategies to regulate forest pests in which all aspects of a pest-host

Management (IPM) system are studied and weighed. A basic principle in the choice of strategy is that it be ecologically compatible or acceptable.

Intensity How hot a fire is. Specifically, a measure (in BTU's per foot per second) of the energy released per unit of time in an area of actively burning fire. The amount of heat released per foot of fire front per second.

Inter To place in a grave or tomb.

Interceptions The process by which precipitation is caught and held by foliage, twigs, and branches of trees, shrubs, and other vegetation, and lost by evaporation, never reaching the surface of the ground. Interception equals the precipitation on the vegetation minus stemflow and throughfall.

Interest A general term to denote a right, claim, title, or legal share in real estate (Black 1979).

Interdisciplinary Team (IDT) A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view and a broader range of expertise to bear on the problem.

Invertebrate population That population of creatures without a backbone. Context would depict whether land invertebrates, shore invertebrates, or water invertebrates.

Invertebrates Animals without a backbone.

IPM See Integrated Pest Management.

Irretrievable commitments Applies to losses of production or use of renewable natural resources for a period of time. For example, timber production from an area is irretrievably lost during the time an area is allocated to a no-harvest prescription. If the allocation is changed to allow timber harvest, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible commitments Decisions causing changes which cannot be reversed. For example, if a roadless area is allocated to allow timber harvest and timber is actually harvested, that area cannot, at a later date, be allocated to Wilderness. Once harvested, the ability of that area to meet Wilderness criteria has been irreversibly lost. Often applies to nonrenewable resources such as minerals and cultural resources.

Issue A point, matter, or section of public discussion or interest to be addressed or decided.

K

Karst A type of topography that develops in areas underlain by soluble rocks, primarily limestone. Dissolution of the subsurface strata results in areas of well-developed, surface drainage that are sinkholes, collapsed channels, or caves.

L

Lacustrine wetland Includes permanently flooded lakes and reservoirs, intermittent lakes, and tidal lakes with ocean-derived salinities of less than 0.5 percent. Typically, there are extensive areas of deep water and there is considerable wave action.

Land allocation The decision to use land for various resource management objectives to best satisfy the issues, concerns and opportunities and meet assigned forest output targets.

Land exchange The conveyance of non-Federal land or interests to the United States in exchange for National Forest System land or interests in land.

Land Use Designation (LUD) (As used in the 1979 Tongass Land Management Plan:)
General management direction applied to a Value Comparison Unit or group of Value Comparison Units. These four land use designations are defined as follows.

LUD 1 Forest Service recommended Wilderness areas, most of which became Wilderness through the Alaska National Interest Lands Conservation Act. In general, these undeveloped areas are managed for solitude and primitive types of recreation, and contain unaltered habitats for plants and animal species. These areas are managed as directed in the 1964 Wilderness Act, as amended.

LUD 2 Lands under this designation are managed in a roadless state to retain their wildland character. Primitive recreational facilities can be built and habitat improvements for fish and wildlife are permitted. Timber harvest on these lands is limited to salvage operations to protect other resources.

LUD 3 These lands are managed for a variety of uses. The emphasis is on managing for both amenity and commodity oriented uses in a compatible manner to provide the greatest combination of benefits. These areas usually have high amenity values in conjunction with high commodity values. Allowances in calculated potential timber yield have been made to meet multiple-use coordination objectives.

LUD 4 These lands are managed to provide opportunities for intensive development of resources. Emphasis is primarily on commodity, or market resources and their use. Amenity values are also provided for. When conflicts over competing resource uses arise, conflicts would most often be resolved in favor of commodity values. Allowances in calculated potential timber yield have been made to provide for protection of physical and biological productivity.

Land Use Designation (LUD) (As used in the Tongass Land Management Plan Revision:)
A defined area of land specific to which management direction is applied. (See also Land Use Prescriptions.)

Land Use Prescriptions Specific management direction applied to a defined area of land (land use designation as defined in the Revision) to attain multiple use and other goals and objectives.

Land Utilization Project (LUP) A unit designated by the Secretary of Agriculture for conservation and utilization under Title III of the Bankhead-Jones Farm Tenant Act (USDA Forest Service, undated, Land Areas of the National Forest System).

Landform Any physical, recognizable form or feature of the earth's surface, having a characteristic shape, and produced by natural causes. Major forms included are plains, plateaus, and mountains; minor forms are hills, valleys, slopes, eskers, and dunes.

Landslides The moderately rapid to rapid downslope movement of soil and rock materials that may or may not be water-saturated.

Large Woody Debris (LWD) Any piece of relatively stable woody material, having a diameter of four inches or greater and a length greater than three feet, that intrudes into a stream channel. Formerly called large organic debris.

Leasable minerals Generally includes minerals such as coal, oil, gas, phosphate, sodium, potassium, oil shale, sulfur, and geothermal steam.

Leave strips The result of timber harvest activities where blocks of timber are left after harvest has occurred.

Lifeform Any living entity, animal or plant.

Locatable minerals Include gold, silver, lead, zinc, copper, and mercury.

Log Transfer Facilities (LTF) Formerly referred to as Terminal Transfer Facilities, Log Transfer Facilities include the site and structures used for moving logs and timber products from land-based transportation forms to water-based transportation forms.

Logging slash The wood residue left on the ground after harvesting. It includes unused logs, uprooted stumps, broken or uprooted stems, tops, branches, and leaves.

Logging systems

Tractor A system of log transportation in which logs are pulled from the woods to a landing by means of a crawler tractor, skidder, or similar ground-based equipment.

High-lead A system of cable logging in which the working lines are elevated at the landing area by a rigged wooden tree or portable steel spar.

Skyline A system of cable logging in which all or part of the weight of the logs is supported during yarding by a suspended cable.

Balloon A system of cable logging in which the weight of the logs is counteracted by the lift provided by a lighter-than-air balloon.

Helicopter A system of transporting logs from the woods to a landing as an external load on a helicopter.

Long-term Sustained Yield Timber Capacity (LTSY) The highest uniform wood yield from suitable-scheduled lands that may be sustained in perpetuity consistent with the Forest Plan.

Lows Atmospheric disturbances that can properly be considered as storms, for they bring changeable, unsettled weather that normally includes widespread, abundant, and often, intensive precipitation.

LTSY See Long-term Sustained Yield Timber Capacity.

LTF See Log Transfer Facilities.

LUD See Land Use Designation. (Note that there are two definitions for Land Use Designation: as used in the 1979 Tongass Land Management Plan and as used in the Tongass Land Management Plan Revision.)

LUP See Land Utilization Project.

LWD See Large woody debris.

M

Macrophytes	Any plant species that can be readily observed without the aid of optical magnification.
Managed stand	A stand of trees in which stocking level control is applied to achieve maximum growth.
MAI	See Mean Annual Increment.
Management Area	Combinations of Value Comparison Units having common management direction. As defined in the Tongass Plan Revision.
Management concern	An issue, problem or a condition which constrains the range of management practices identified by the Forest Service in the planning process.
Management direction	A statement of multiple-use and other goals and objectives, the associated land use prescriptions, and standards and guidelines for attaining them.
Management Indicator Species (MIS)	Species selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.
Management practices	The activities applied to a defined area of land (land use designation as defined in the Revision) to attain multiple-use and other goals and objectives.
Management requirement	Standards for resource protection, vegetation manipulation, silvicultural practices, even-aged management, riparian areas, soil and water and diversity, to be met in accomplishing National Forest System goals and objectives. (See 36 CFR 219.17)
Mariculture	The cultivation of plants and animals in saltwater, with no freshwater component. Mariculture does not include anadromous fish farming.
Marine systems	Of, or belonging to, or caused by, the sea.
Maritime climate	Weather conditions controlled by an oceanic environment characterized by small annual temperature ranges and high precipitation..
Mass-wasting	A general term for a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another. Also, mass movement.
MBF	Thousand Board Feet.
Mean Annual Increment (MAI)	The total volume of a stand divided by its age.
Memorandum of Understanding (MOU)	A legal agreement between the Forest Service and others agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A memorandum of understanding is not a fund obligating document.
Microclimate	The temperature, moisture, wind, pressure, and evaporation (climate) of a very small area that differs from the general climate of the larger surrounding area.
Middleground	The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the landscape. The area is located from 1/4 to 5 miles from the viewer. (See Foreground and Background.)
Mineral development	The activities and facilities associated with extracting mineral deposits.

Mineral entry Filing a mining claim on public land to obtain the right to mine any minerals it may contain. Also the filing for a mill site on Federal land for the purpose of processing off-site minerals.

Mineral exploration The search for valuable minerals on lands open to mineral entry.

Mineral production The extraction of mineral deposits.

Mineral soils Soils consisting predominantly of, and having its properties determined by, mineral matter. These soils usually contain less than 20 percent organic matter, but can contain an organic surface layer up to within 20 inches of the surface.

Mineral withdrawal A formal designation by the Secretary of Interior which precludes entry or disposal of mineral commodities under the mining and/or mineral leasing laws.

Minimum viable population The low end of the number of individuals of a species needed to ensure the long-term existence of the species.

Mining claims A geographic area of the public lands held under the general mining laws in which the right of exclusive possession is vested in the locator of a valuable mineral deposit.

MIS See Management Indicator Species.

Mitigate To lessen or make minimal the severity. For cultural resources, to lessen or minimize an adverse effect upon a cultural resource listed on or eligible for the National Register of Historic Places. The two categories of mitigation most often used are project modification and data recovery.

Mixed conifer In Southeast Alaska, mixed conifer stands usually consist of the following species: western hemlock, mountain hemlock, Alaska yellow-cedar, redcedar, and Sitka spruce. Shorepine may occasionally be present depending on individual sites. Redcedar is not usually in mixed conifer stands on the Chatham or Stikine areas.

MMBF Million Board Feet.

Moderately well-drained soil Water in these soils is removed from them somewhat slowly, so that the profile is wet for a small, but significant, part of the time.

Modification See Visual Quality Objectives.

Moisture regime The variation of moisture content in a specified portion of soil during the year.

Monitoring and Evaluation A process of collecting significant data from defined sources to identify departures or deviations from expected plan outputs.

Mop-up Following suppression activities to stop the spread of the fire, the business of extinguishing the fire is called mop-up.

MOU See Memorandum of Understanding.

Multiple-aged stands An intermediate form of stand structure between even- and uneven-aged stands. These stands generally have two or three distinct tree canopy levels occurring within a single stand.

Multiple use The management of all the various renewable surface resources of the National Forest System so that they are used in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of the resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform

to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

Muskeg A muskeg in Southeast Alaska is a type of bog that has developed over thousands of years in depressions, or flat areas on gentle to steep slopes. These bogs have poorly drained, acidic, organic soils materials that support vegetation that can be either sphagnum moss or herbaceous plants or sedges, rushes, and forbs or may be a combination of sphagnum moss and herbaceous plants. These vegetation types may have a lesser abundance of shrubs and stunted trees.

N

National Cooperative Soil Survey (NCSS) A program consisting of a joint effort of cooperating Federal agencies, land-grant universities, and other state and local agencies to map soils, collect soil data, interpret the maps and data, and promote their use. Federal leadership is provided by the Soil Conservation Service (SCS).

National Environmental Policy Act of 1969 (NEPA) An act declaring a National policy to encourage productive harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere and simulate the health and welfare of man, to enrich the understanding of the ecological systems and natural resources important to the Nation and to establish a Council on Environmental Quality.

National Fire Management Analysis System (NFMAS) A broad umbrella process to help fire managers identify the most efficient fire program meeting the direction in the Forest plan. This includes information for the planning record on program composition, annual programmed costs, emergency fire fighting costs, expected resource impacts, and net value change.

National Forest Management Act (NFMA) A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest Plans.

National Forest System (NFS) Land Federal lands that have been designated by Executive order or statute as National Forests, National Grasslands, or Purchase Units, or other lands under the administration of the Forest Service.

National Register of Historic Places A register of cultural resources of national, state, or local significance, maintained by the Department of the Interior.

National Wild and Scenic River System Rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition.

Native selection Application by Native corporations formed under authority of the Alaska Native Claims Settlement Act of 1971 (ANCSA - Public Law 92–203, 85 Stat. 688) and by Native individuals (under Section 14(h)(5), ANCSA) to the USDI Bureau of Land Management (BLM) for conveyance of a portion of lands withdrawn under ANCSA in fulfillment of Native entitlements established under ANCSA. Native village corporations had three years from the date of ANCSA (December 18, 1971) to make their selections and regional corporations had four years. Native individuals who met the criteria had two years from the date of ANCSA to make

application under Section 14(h)(5). BLM regulations allowed Native corporations formed under ANCSA to select in excess of their entitlements to ensure sufficient land would be available to meet full entitlement. Remaining lands in excess of entitlement which have been selected but not conveyed will revert back to unencumbered National Forest System land status after full entitlement is reached.

Net public benefit The overall long-term value to the Nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index.

Net sawlog volume Trees suitable in size and quality for producing logs that can be processed into lumber. In Southeast Alaska, depending on the market, the volume may be processed as pulp or lumber.

No action alternative (Alternative C) The most likely condition expected to exist in the future if current management direction were to continue unchanged.

No adverse effect When the effect on a cultural resource would not be considered harmful to those characteristics that qualify the property for inclusion in the National Register.

Noncommercial species Species that have no economic values at this time nor anticipated timber value within the near future.

Nondeclining even flow A policy governing the volume of timber removed from a National Forest, which states that the volume planned for removal in each succeeding decade will equal or exceed that volume planned for removal in the previous decade.

Nonforest land Land that has never supported forests and lands formerly forested but now developed for such nonforest uses as crops, improved pasture, etc.

Nonmarket Products derived from National Forest resources that do not have a well-established monetary (market) value, for example, wilderness, wildlife. (Noncash economic benefits.)

O

Objectives The precise steps to be taken and the resources to be used in achieving goals.

Off-Highway Vehicle (OHV) Any vehicle which is restricted by law from operating on public roads for general motor vehicle traffic. Includes motorbikes, minibikes, trailbikes, snowmobiles, dunebuggies, all-terrain vehicles, and four-wheel drive, high clearance vehicles (FSM 2355.01). Sometimes referred to as Off-Road Vehicle or "ORV".

OHV See Off-Highway Vehicle.

Old growth Ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include larger tree size, higher accumulations of large dead woody material, multiple canopy layers, different species composition, and different ecosystem function. The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

Open road density The length of forest development roads open for public access and use per unit area of land; usually expressed as miles of open road per square mile of land.

Operability	Operability refers to timber harvest operability, defined as the method(s) of timber harvest necessary to get the trees from stump to landing. There are three different classes of operability: normal (tractor and highlead cable), difficult (long span skyline), and isolated (helicopter).
Operation and maintenance costs	Costs associated with operating and maintaining facilities, program management, and support costs associated with management of other resources.
ORACLE	A relational database management system software package.
Order three inventory	A level of soil surveys made for extensive land uses that do not require precise knowledge of small areas or detailed soils information. Such survey areas are usually dominated by a single land use and have few subordinate uses. This information can be used in planning for range, forest, recreational areas, and similarly extensive land uses and in community planning.
Order four inventory	A soil survey level made for extensive land uses that require general information for broad statements concerning land-use potential and general land management. This information can be used in locating, comparing, and selecting suitable areas for major kinds of land use in regional land-use planning, and in selecting areas for more intensive study and investigation.
Ordinary high water mark	The mark along the bank or shore up to which the presence and action of the nontidal water are common and usual, and so long continued in all ordinary years, as to leave a natural line impressed on the bank or shore and indicated by erosion, shelving, changes in soil characteristics, destruction of terrestrial vegetation, or other distinctive physical characteristics. (Consult 11 AAC 53.900 — Alaska Code.)
Organic soils	Soils which contain a high percentage (greater than 15 percent) of organic matter throughout the soil depth.
ORV	Off-Road Vehicle. (See Off-Highway Vehicle.)
Output	The measurable goods, end products, or services resulting from management activities that are purchased, consumed, or used directly by people.
Overflow	High runoff which overflows natural stream and river banks. Also known as flooding.
Overmature	The stage at which a tree declines in vigor and soundness, for example, height growth has usually stopped and probability of mortality is high.
Overselection	Unconveyed lands selected in excess of entitlement. Overselections by the State of Alaska are authorized in Section 906 (f), ANILCA. They are authorized for Native Corporations organized under ANCSA in Federal Regulations (43 CFR 2650).
Overstory	The portion of trees in a forest which forms the upper most layer of foliage.

P

Palustrine wetland	Pertaining to swamps or marshes and to material deposited in a swamp environment.
Parent material	The unconsolidated, and more or less chemically weathered, mineral or organic matter from which soils develop.
Partial cut	Any cutting other than a clearcut. This may include thinning, selection, shelterwood or an overstory removal.
Partial retention	See "Visual Quality Objectives."

Parts per million (PPM)	A measurement of concentration indicating the quantity of a substance per unit volume of a solution.
Parturient	Of or relating to giving birth.
Payments to states	A fund consisting of approximately 25 percent of the gross annual timber receipts received by the National Forests in that state. This is returned to the State for use on roads and schools.
Peak flow	The highest discharge of water recorded over a specified period of time at a given stream location. Often thought of in terms of spring snowmelt, summer, fall or winter rainy season flows. Also called maximum flow.
pH	The degree of soil acidity or alkalinity.
Plan of operations	A plan of operations is required from anyone whose proposed operations, under the 1872 Mining Law, would cause, "significant surface disturbance." It is a document by which mineral operators identify themselves, describe the work they intend to do, where and when they intend to do it, the nature of any proposed disturbance of surface resources, and the steps they will take to protect these resources. An approved plan of operations is basically an agreement between the Forest Service and the operator. The operator agrees to observe necessary and reasonable precautions, spelled out in this plan, to reduce damage to surface resources during operation activities and to rehabilitate disturbed areas as and when feasible. In turn, the Forest Service agrees that protection of surface resources will be adequate if operations are carried out in accordance with the provisions of the approved plan.
Plan period	The period of time a Forest Plan is in effect, normally 10 years, but no longer than 15 years.
Planning area	The area of the National Forest System controlled by a decision document.
Planning horizon	The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.
Planning period	Generally one decade. The time interval within the planning horizon that is used to show incremental changes to yields, costs, effects, and benefits.
Planning records	A system that records decisions and activities that result from the process of developing a forest plan, revision, or significant amendment.
Plant association	Climax plant community type.
Plant communities	A homogeneous unit in respect to the number and relationship of plants in the tree, shrub, and ground cover strata.
Plant communities	Aggregations of living plants having mutual relationships among themselves and to their environment. More than one individual plant community.
Point source (pollution)	A point at which pollution is added to a system, either instantaneously or continuously. An example is a smokestack.
Pole	An immature tree between 5 and 9 inches diameter breast height.
Pollution	The presence of matter or energy whose nature, location, or quantity produces undesired environmental effects.
Poorly drained soils	Water in these soils is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year.

Population viability — Ability of a population to sustain itself.

Positive control — The condition that exists when fish and other mobile species are enclosed in an escape-proof barrier for rearing and other clams (bivalves) or aquatic plants are managed for cultivation in unenclosed water.

Potential yield — The maximum, perpetual, sustained-yield harvest attainable through intensive forestry on regulated areas considering the productivity of the land, conventional logging technology, standard cultural treatments, and interrelationships with other resource uses and the environment.

PPM — See Parts per million.

Present Net Value (PNV) — The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

Prescribed fire — A wildland fire burning under planned conditions to accomplish specific land and resource objectives. It may result from either a management or natural ignition.

Preservation — A technique of conservation which maintains the resource in or on the ground in perpetuity.

Prevention of Significant Deterioration (PSD) — The process incorporated in the Clean Air Act which requires emission limitations for certain new or modified sources. (See also Class II Area.)

Primary stream production — Results from photosynthesis by green plants. In streams, includes production from algae and aquatic plants, and from non-stream sources such as leaf litter.

Primary succession — Vegetation development is initiated on newly formed soils or upon surfaces exposed for the first time (as by landslides) which have, as a consequence, never borne vegetation before. Any succession beginning on a bare area not previously occupied by plants or animals.

Priority use — A Forest Service commitment to the holder of a permit for outfitting and guiding to give priority consideration to granting the holder a specific amount of available future use.

Process Group — A combination of similar channel types based on major differences in landform, gradient and channel shapes.

Programmatic Environmental Impact Statement — The document disclosing the environmental consequences of a program or plan which guides or prescribes the use of resources, allocates resources, or establishes rules and policies in contrast to disclosure of the environmental consequences of a site-specific project.

Proponent — An agency, institution, or individual applying to perform an activity on National Forest System lands under authority of a mining plan of operation, contract, license, special use authorization, or other agreement.

Project — One or more site-specific activities designed to accomplish a specific on-the-ground purpose or result.

PSD — See Prevention of Significant Deterioration.

Public issue — A subject or question of widespread public interest relating to management of the National Forest System.

Public participation — Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service planning.

Purchase unit A unit designated by the Secretary of Agriculture or previously approved by the National Forest Reservation Commission for purposes of Weeks Law acquisition. (USDA Forest Service, undated, Land Areas of the National Forest System)

Purchaser road credit Credit earned by the purchaser of a National Forest timber sale by construction of contract-specified roads. Earned purchaser credit may be used by the purchaser as payment for National Forest timber removed.

R

Real dollar value A monetary value which compensates for the effects of inflation.

Reconstruction Road or trail construction activities which take place on an existing road or trail and raise the standard of the road or trail. This can include relocation of the facility in a completely new location.

Recreation capacity The number of people that can take advantage of the supply of a recreation opportunity during an established use period without substantially diminishing the quality of the recreation experience or the resources.

Reburial and reinterment The replacement of disinterred human remains into the ground or otherwise disposing of such remains in a manner likely to approximate the wishes of the deceased (e.g., placement in burial caves, legal cemeteries, surface mortuary structures, or cremation where traditionally practiced).

Recreation Opportunity Spectrum (ROS) A system for planning and managing recreation resources that categorizes recreation opportunities into six classes. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area and the relative density of recreation use. The six classes are:

Primitive An essentially unmodified natural environment of fairly large size. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use is generally not permitted.

Semi-Primitive Non-Motorized A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Use of local roads for recreational purposes is not allowed.

Semi-Primitive Motorized A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Local roads used for other resource management activities may be present.

Roaded Natural A natural-appearing environment with moderate evidence of the sights and sounds of humans. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.

Roaded Modified A natural environment that has been substantially modified particularly by vegetative manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.

Rural — A natural environment that has been substantially modified by development of structures, vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.

Recreation places — Identified geographical areas having one or more physical characteristics that are particularly attractive to people engaging in recreation activities. They may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin site, or campground.

Recreation Visitor Day (RVD) — A measure of recreation use of an area. One recreation visitor day consists of 12 hours of recreation use of a site or area. Recreation visitor days are used to measure recreation production or output capacity.

Reducing soil condition — An environment in the soil conducive to the removal of oxygen and chemical reduction of ions caused by saturated soil conditions.

Reforestation — The natural or artificial restocking of an area usually to produce timber and other wood products, but also to protect watersheds, prevent soil erosion, and improve wildlife, recreation and other natural resources. Natural reforestation includes site preparation to reduce competing vegetation and provide a mineral seed bed for seed provided by seed trees. Artificial reforestation is the planting of seedlings, cuttings or seeds by hand or mechanical means and may include site preparation.

Regeneration treatment — Treatments and activities that relate to the reestablishment of stands of trees. Includes planting, seeding, and preparing the ground for seeding from adjacent stands where ground preparation is not necessary.

Regulated volume — The quantity of timber in the allowable sale quantity that is based on the growth and yield projections for growing stock.

Rehabilitation — Actions taken to protect or enhance site productivity, water quality, or other values for a short period of time.

Relinquish — To abandon, to give up, to surrender, to renounce some right or thing (Black 1979).

Research and Experiment Area — A unit reserved and dedicated by the Secretary of Agriculture for forest or range research and experimentation. (USDA Forest Service, undated, Land Areas of the National Forest System)

Research design — A statement of work to be done toward a particular goal. The research design details what will be done, how it will be done, what is required to do it, and why it is important or useful to do the work .

Research Natural Area (RNA) — An area in as near a natural condition as possible, which exemplifies typical or unique vegetation and associated biotic, soil, geologic, and aquatic features. The area is set aside to preserve a representative sample of an ecological community primarily for scientific and educational purposes; commercial and most public uses are not allowed.

Resident fish — Fish that are not migratory and complete their entire life cycle in fresh water.

Resource values — The tangible and intangible worth of forest resources.

Responsible Official — The Forest Service employee who has the delegated authority to make a specific decision.

Restoration — The long-term placement of land back into its natural condition or state of productivity.

Retention — The amount of commercial forest land removed from the timber base to protect other resource values.

Revegetation — The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseeding.

Riffles — Shallow rapids in an open stream, where the water surface is broken by waves caused by wholly or partially submerged obstructions.

Right-of-Way — The right to pass through another person's land as obtained by condemnation or purchase.

Riparian area — The area including a stream channel, lake or estuary bed, the water itself, and the plants that grow in the water and on the land next to the water.

Riparian ecosystem — Land next to water where plants that are dependent on a perpetual source of water occur.

Riparian management area — The area including water, land and plants that is at least 100 slope feet away from each side of perennial streams, lakes and other bodies of fresh water.

Riverine wetland — A category in wetland classification which includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 percent.

RNA — See Research Natural Area.

Road density — The number of road miles per square mile of land area.

Roadless area — An area of undeveloped public land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use.

Road Maintenance Level — Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria (FSH 7709.58, section 12.3).

- **Maintenance Level 1** — Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period is one year or longer. Basic custodial maintenance is performed.
- **Maintenance Level 2** — Assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration.
- **Maintenance Level 3** — Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities.
- **Maintenance Level 4** — Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds.
- **Maintenance Level 5** — Assigned to roads that provide a high degree of user comfort and convenience. Normally, roads are double-laned and paved, or aggregate surfaced with dust abatement.

ROS — See Recreation Opportunity Spectrum.

ROS Existing — See ROS Inventoried.

ROS Inventoried — A general inventory of the physical, social and managerial setting for recreation, based on remoteness from modern human development and activity, modification of the land, and social factors such as crowding.

Rotation	The planned number of years between the formation or the regeneration of a crop or stand of trees and its final cutting at a specified stage of maturity.
Rotation age	The age of a stand when harvested at the end of a rotation.
RPA	Forest and Rangeland Renewable Resources Planning Act.
RPA Assessment and Program	The RPA Assessment is prepared every ten years and describes the potential of the nation's forests and rangelands to provide a sustained flow of goods and services. The RPA Program is prepared every five years to chart the long-term course of Forest Service management of the National Forests, assistance to State and private landowners, and research. They are prepared in response to Sections 3 and 4 of the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) (16 U.S.C. 1601).
Rubble	All accumulations of loose angular rock fragments, commonly overlying outcropping rock.
Rural development	Rural Development is the management of human, natural, technical, and financial resources needed to improve living conditions, provide employment opportunities, enrich the cultural life, and enhance the environment of rural America. In the National Forest System, rural development is accomplished through partnerships.

S

Saleable minerals	Include common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. In general, these minerals are of wide-spread occurrence and are of relatively low unit value. They are generally used for construction materials and for road building purposes.
Salvage harvest	Removal of dead or dying trees resulting from insect and disease epidemics or wildfire.
Saturated soils	Soil condition where all the spaces between soil particles are filled with water.
Sawlogs (Saw timber)	That portion of a tree that is suitable in size and quality for the production of dimension lumber collectively known as saw timber.
Scoping	Determination of the significant issues to be addressed in an environmental impact statement.
Scrub-Shrub wetland	Wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. In Southeast Alaska this includes forested lands where trees are stunted because of poor soil drainage.
Second growth	Forest growth that has come up naturally or has been planted after some drastic interference (for example, clearcut harvest, serious fire, or insect attack) with the previous forest growth.
Secondary stream production	Results from consumption by animals of materials produced in primary production in streams; this includes production of macroinvertebrates and some fish species.
Secondary succession	The process of reestablishing vegetation after normal succession is disrupted by fire, cultivation, lumbering, windthrow, or any similar disturbance.
Sediment	Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Seed tree Small number of seed-bearing trees left singly or in small groups after timber harvest to provide seed for regeneration of the site.

Selection cutting The annual or periodic removal of trees (particularly the mature), individually or in small groups from an uneven-aged forest to achieve the balance among diameter classes needed for sustained yields, and in order to realize the yield, and establish a new crop of irregular constitution. Note: The improvement of the Forest is a primary consideration.

Selection system A silviculture system in which trees in an uneven-aged stand are removed individually, here and there, from a large area each year in order to achieve a balance among diameter classes needed for sustained yield by selection cutting.

Sensitive species Plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Species that have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the Regional Forester as needing special consideration to assure viable populations and to prevent their being placed on Federal or state lists.

Sensitive travel route A road system or marine water way which receives a moderate to high degree of use by the public, both Alaskan residents and tourists.

Sensitivity level A measure of the people's concern for the scenic quality of the National Forest applied to travel routes, use areas, and water bodies.

Sensitivity zone A body of land which has been classified on the basis of cultural and environmental data, as having a high, medium, or low likelihood for containing cultural resources.

Settlement sale The disposition of timber or other national forest products, cut, damaged or destroyed in conjunction with an authorized occupancy of a right-of-way or other use of National Forest Land. In wilderness it would be the sale of timber removed from an inholding access road or privately developed hatchery site. Also, the compensation of the United States for property taken or rendered unusable for other purposes incidental to some lawful use of National Forest land. When timber has a value, clearing the land for some use other than growing timber constitutes a forced sale.

Shelterwood harvest The removal of a stand of trees through a series of cuttings designed to establish a new crop with seed and protection provided by a portion of the stand.

SHPO See State Historic Preservation Officer.

Significant change (Soils) Change in productivity of the land as indicated by changes in soil properties that are expected to result in a reduced productive capacity over the planning horizon. Based on available research and current technology, a guideline of 15 percent reduction in inherent soil productivity potential is used as a basis for setting threshold values for measurable or observable soil properties or conditions. The threshold values, along with areal extent limits, will serve as an early warning signal of reduced productive capacity. A more stringent basis than 15 percent can be used where appropriate and documented.

Significant impairment (Soils) Changes in the productivity of the land as indicated by changes in soil properties which would result in significant changes in the inherent productive capacity that last beyond the planning horizon.

7 Glossary

Silvicultural system A management process whereby forests are tended, harvested, and replaced resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the process (See single-tree selection, shelterwood cutting, group selection, even-aged management, uneven-aged management, and clearcut).

Silviculture The science and art of growing and tending crops of forest trees to attain the desired level of marketable and unmarketable products.

Significant surface disturbance Changing the above-ground environment so much that returning that site to the condition it was in before the change is difficult or impossible. Road construction, use of mechanical earthmoving equipment including backhoes and bulldozers, construction of buildings, and cutting of timber are all examples of activities that are considered to cause significant disturbance to surface resources. An evaluation of proposed operations must be made on a case by case basis to determine if disturbance is considered significant. For example, a mining activity in an alpine area may result in significant disturbance that takes years to reclaim while the same activity conducted at a lower elevation where natural conditions are not as severe may result in a disturbance that would take only a few months to successfully reclaim.

Single-tree selection A cutting method to develop and maintain uneven-aged stands by removal of selected trees from specified age classes over the entire stand area in order to meet a predetermined goal of age distribution and species in the remaining stand.

Site index A measure of the relative productive capacity of an area for growing wood. Measurement of site index is based on height of the dominant trees in a stand at a given age.

Site preparation Removing unwanted vegetation and debris from a site and preparing the soil before reforestation.

Site productivity Production capability of specific areas of land.

Skyline logging See "Logging systems".

Slash Debris left after logging, pruning, thinning, or brush cutting, and large accumulations of debris resulting from windstorms. It includes logs, bark, branches, and stumps.

Slope distance Distance measured along the contour of the ground.

Slough A section of an abandoned river channel containing stagnant water and occurring on a floodplain or delta.

Smolt A young silvery-colored salmon or trout which moves from freshwater streams to saltwater.

Snag A non-living standing tree usually greater than 5 feet tall and 6 inches in diameter at breast height. The interior of the snag may be sound or rotted.

Soil conservation practices Practices that are mechanisms used to protect soil quality while managing for other resource goals and objectives. They can be administrative, preventive or corrective measures. They are identified during project planning and design.

Soil drainage The rapidity and extent of the removal of water from the soil, in relation to additions especially by surface runoff and by flow through the soil to underground spaces.

Soil mass movement See mass movement.

Soil productivity The capacity of a soil, in its normal environment, to produce a specific plant or sequence of plants under a specific system of management.

Soil quality standards — Standards that are a combination of 1) "threshold" values for severity of soil property alteration, or significant change in soil properties conditions, and 2) areal extent of disturbance.

Soil Resource Inventory (SRI) — An inventory of the soil resource based on landform, vegetative characteristics, soil characteristics, and management potentials.

Somewhat poorly drained soil — Water in the soil is removed from the soil slowly enough to keep it wet for significant periods but not all of the time.

Special habitats — Structural elements of ecosystems. These may include, but are not limited to: snags, spawning gravels, fallen trees, aquatic reefs, caves, seeps, and springs.

Special Use Authorization — A permit, term permit, temporary permit, lease, or easement that allows occupancy or use of, or rights and privileges on National Forest System lands.

Special Use Permit — Permits and granting of easements (excluding road permits and highway easements) authorizing the occupancy and use of land.

Speleotherm — Any secondary mineral deposit or cave formation that is formed by the action of water. Examples are stalagmites, stalactites, flow stone, bacon rind drapery, helictites, soda straws, and crystal growths.

Split lines — The process of separating the direction of timber harvest yarding into opposite directions.

SRI — See Soil Resources Inventory.

Stabilization — The process of arresting the deterioration of a damaged cultural resource in order to prevent further damage from occurring. Stabilization may include reconstructing portions of the cultural resource.

Stand — A group of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition as to be distinguishable from the trees in adjoining areas.

Standards and Guidelines — Requirements which preclude or impose limitations on resource management activities, generally for the purposes of environmental protection and safety.

State Historic Preservation Officer (SHPO) — The official appointed or designated pursuant to Section 101(b)(1) of the National Historic Preservation Act of 1966, as amended, to administer the State Historic Preservation Program.

State selection — (from National Forest System lands) Application by Alaska Department of Natural Resources to the USDI Bureau of Land Management for conveyance of a portion of the 400,000 acre State entitlement from vacant and unappropriated National Forest System lands in Alaska, under authority of Section 6(a) of the Alaska Statehood Act of 1959 (Public Law 85-508, 72 Stat. 340). For lands to be conveyed, State selections must be approved by the USDA Forest Service, Regional Forester, Alaska Region under criteria of the Statehood Act. Until approved by the Regional Forester, the State application is not considered a valid selection. The State can select up to 25 percent in excess of its remaining entitlement.

7 Glossary

Strata — The process of aggregating areas with similar resource conditions into broad categories for analysis purposes. For example, existing timber stands are aggregated into Stratas A through D, with A having the lowest timber values and D having the highest. In the geographic information system (GIS), several resource strata can be layered for multiresource analysis.

Strata A — Synonymous with Volume Class 4 (8-20,000 net board feet/acre.)

Strata B — Synonymous with Volume Class 5 (20-30,000 net board feet/acre.)

Strata C — Synonymous with Volume Class 6 (30-50,000 net board feet/acre.)

Strata D — Synonymous with Volume Class 7 (50,000+ net board feet/acre.)

Stratigraphic — Depositional units or layers of sediment distinguished by composition or appearance that are associated with archaeological and historic sites.

Stream class — A means to categorize stream channels based on their fish production values. There are three stream classes on the Tongass National Forest. They are:

Class I — Streams with anadromous (fish ascending from oceans to breed in freshwater) or adfluvial (fish ascending from freshwater lakes to breed in streams) lake and stream fish habitat. Also included is the habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish and habitat with high value resident sport fish populations.

Class II — Streams with resident fish populations and generally steep (often 6-15 percent) gradient (can also include streams from 0-5 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values. These streams generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III — Streams with no fish populations but have potential water quality influence on the downstream aquatic habitat.

Streamflow — The discharge of water from a watershed that occurs in a natural stream channel.

Stream order — First order streams are the smallest unbranched tributaries; second order streams are initiated by the point where two first order streams meet; third order streams are initiated by the point where two second order streams meet, and so on.

Subsistence — Section 803 of the Alaska National Interest Lands Conservation Act defines subsistence use as, "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

Substrate — The size of rock in the bed (bottom) of rivers and streams.

Suitable forest land — Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions, and for which there is reasonable assurance that such lands can be adequately restocked, and for which there is management direction that indicated that timber production is an appropriate use of that area.

scheduled lands — Land suitable and scheduled for timber production and which are in the land base for the calculation of the allowable sale quantity and long-term sustained yield timber capacity.

unscheduled lands — Lands suitable but not scheduled for timber production and which are not in the land base for the calculation of the allowable sale quantity nor long-term sustained yield timber capacity.

Suppression The act of extinguishing or confining a fire.

Suspended sediment The very fine soil particles which remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom.

Sustained yield The amount of renewable resources that can be produced continuously at a given intensity of management.

Swale A slight, marshy depression in generally level land. A depression in glacial ground moraine.

T

Targets Objectives assigned to the Forest by the Regional Plan.

Temporary facility Any structure or other human-made improvement which can be readily and completely dismantled and removed from the site when the authorized use terminates.

Temporary roads Low-level roads constructed for a single purpose and short-term use. Once use of the road has been completed, it is obliterated, and the land it occupied is returned to production.

Tentatively suitable Forest Land Forest land that is producing or is capable of producing crops of industrial wood and: (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

Terrestrial ecosystems Plant communities that are not dependent on a perpetual source of water to grow.

Thinning The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may also be done to change the characteristics of a stand for wildlife or other purposes. Thinning may be done at two different stages:

Precommercial Removing trees that are too small to make a merchantable product to improve tree spacing and promote more rapid growth.

Commercial Removing trees that have reached sufficient size to be manufactured into a product to improve tree spacing and promote more rapid growth.

Threatened Species Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range and which has been designated in the Federal Register by the Secretary of the Interior as a threatened species.

Threshold The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system.

Tiering Elimination of repetitive discussions of the same issue by incorporating by reference the general discussion in an environmental impact statement of broader scope. For example, a project environmental assessment could be tiered to the Forest Plan EIS.

Timber A general term for the major woody growth of vegetation in a forest area.

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Timber classification — Forested land is classified under each of the land management alternatives according to how it relates to the management of the timber resource. The following are definitions of timber classifications used for this purpose.

Nonforest — Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses.

Forest — Land at least 10-percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use.

Suitable — Land to be managed for timber production on a regulated basis.

Unsuitable — Forest land withdrawn from timber utilization by statute or administrative regulation (for example, wilderness), or identified as inappropriate for timber production in the Forest planning process.

Commercial forest — Forest land tentatively suitable for the production of continuous crops of timber and that has not been withdrawn.

Timber dispersion — When a opening created from a final timber harvest is no longer considered an opening for the purpose of scheduling adjacent timber harvest. This is often expressed as the maximum amount of disturbance in a watershed at any given time.

Timber harvest schedule — The quantity of timber planned for sale and harvest, by time period, from the area of land covered by the Forest Plan.

Timber production — The purposeful growing, tending, harvesting, and regeneration of trees for industrial or consumer use.

Timber Stand Improvement (TSI) — All noncommercial intermediate cuttings and other treatments to improve composition, condition, and volume growth of a timber stand.

Tongass Resource Use Cooperative Survey (TRUCS) — A study done to gather information on subsistence uses of the Forest.

Top filing — The filing of a future selection application by the State of Alaska, subject to valid existing rights, for lands which are not available for selection on the date of filing. If otherwise valid, these applications become an effective selection, without further action by the state, upon the date included lands become available for selection. Top filings for the State of Alaska are authorized by Section 906(e), ANILCA.

Total stream discharge — Total water outflow from stream or river.

Traffic Service Level (TSL) — Describes a road's significant traffic characteristics and operating conditions. The levels reflect a number of factors, such as speed, travel time, traffic interruptions, freedom to maneuver, safety driver comfort, convenience, and operating costs. These factors, in turn, affect design elements such as number of lanes, turnout pacing, lane widths, type of driving surface, sight distances, design speed, clearance, horizontal and vertical alignment, curve widening, and turnarounds.

TSL A — Reflects transportation efficiency and mobility with few interruptions to flow and a stable smooth driving surface.

TSL B — Generally would have alignment more influenced by topography, more interruptions but still usually a stable smooth driving surface.

TSL C One could expect much more sinuous alignment to reduce construction costs with a surface that may not be stable under all traffic or weather conditions.

TSL D Generally constructed for a single purpose and traffic is discouraged for other purposes; surface and alignment is rough and irregular; very low speeds are anticipated to be able to safely negotiate the road.

Transportation and Utility System (TUS) Significant corridors, with their associated sites used to accommodate public transportation and energy transmission needs.

Avoidance Area An area where the establishment and use of transportation or utility corridors and sites is not desirable given the land use designation emphasis. A search for "windows" should be exhausted before TUS facilities are considered in avoidance areas. When practical, these areas should be avoided through site-specific analysis during project-level planning. Avoidance areas often include Congressionally and administratively designated areas. Although special environmental and procedural considerations may be required for these areas, these special designations do not preclude consideration and use as a TUS. Avoidance areas are designated through the allocation of lands to management prescriptions specifically identified as TUS avoidance areas in their standards and guidelines.

Exclusion Area A large area (large enough to cause significant barriers) which legislatively precludes transportation and utility systems. Due to special authorities provided in Title XI, ANILCA, there will be no exclusion areas on the Tongass.

Window An area potentially available for the location of transportation or utility corridors and sites.

Transportation/Utility corridor A linear strip of land identified for the present location of transportation or utility rights-of-way within its boundaries (USDA Forest Service, Region 6 memo dated December 2, 1987 from Director of Lands and Minerals to Director of Planning).

Travel management Providing for the safe, environmentally responsible, and customer responsive movement of vehicles and people to and through public lands (social attributes).

TRUCS See Tongass Resource Use Cooperative Survey.

Trust A right of property, real or personal, held by one party for the benefit of another (Black 1979).

TSI See Timber Stand Improvement.

TSL Traffic Service Level.

TTRA Tongass Timber Reform Act of 1990.

Turbidity An expression of the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through a water sample; turbidity in water is caused by the presence of suspended matter such as clay, silt, finely divided organic and inorganic matter, plankton, and other microscopic organisms.

TUS See Transportation and Utility System.

U

Unconfined streams Streams that, due to lack of stream incision, and effects of geomorphic landform characteristics and local geologic conditions, result in streams overflowing their banks, changing flows to other channels, and establishing new channels during flood conditions.

Understory vegetation Grass, small trees, shrubs, and other plants found beneath the overstory (the trees comprising the forest).

Undertaking In cultural resources, any project, activity, or program that can result in changes in the character or use of historic properties, if any such properties are located in the area of potential effects. The project, activity, or program must be under the direct or indirect jurisdiction of a Federal Agency or be licensed or assisted by a Federal agency. Undertakings include new and continuing projects, activities, or programs and any of their elements not previously considered under Section 106, National Historic Preservation Act of 1966, as amended.

Uneven-aged management The application of actions needed to maintain high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes. Cutting methods that develop and maintain uneven-aged stands are single-tree and group selection.

Unsuppressed A fire that remains unextinguished or unconfined. The spread has not been halted.

Utility (Pulp) volume Logs that do not meet minimum requirements for sawtimber but are suitable for the production of usable pulp chips.

Utilization standards Standards guiding the use and removal of timber. They are measured in terms of diameter at breast height (DBH) and top of the tree inside the bark (top DIB) and the percentages of "soundness" of the wood.

V

V-Notches A deeply incised valley along some waterways that would look like a "V" from a frontal view. These abrupt changes in terrain features are often used as harvest unit or yarding boundaries.

VAC See Visual Absorption Capability.

Valid Having legal strength or force, executed with proper formalities, incapable of being rightfully overthrown or set aside (Black 1979).

Valid existing rights The rights afforded someone to explore and extract minerals from an area that has been withdrawn from mineral entry because they staked their claim before the area was withdrawn.

Valley An elongated, relatively large, externally drained depression of the earth's surface that is primarily developed by stream erosion.

Valley bottom A general term for the nearly level to gently sloping part of a valley. Also referred to as the valley floor.

Value Comparison A distinct geographic area that generally encompasses a drainage basin containing one or more

Unit (VCU) large stream systems. Boundaries usually follow easily recognizable watershed divides. These units were established to provide a common set of areas for which resource inventories could be conducted and resource value interpretations made.

VCU See Value Comparison Unit.

Vegetation release The freeing of vegetation (grass, forbs, brush, trees) by eliminating the competition for nutrients, water, and sunlight. Once competition for these items has been eliminated, subdued, or stagnated, vegetation will display vigor and growth.

Veneer log A log considered suitable in size and quality for producing veneer which is a thin sheet of wood of uniform thickness.

Very poorly drained soils Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time. Soils of this drainage class usually occupy level or depressed sites and are frequently ponded.

Viable population The number of individuals of a species required to ensure the long-term existence of the species in natural, self-sustaining populations adequately distributed throughout their region.

Viewshed An expansive landscape or panoramic vista seen from a road, marine water way or specific viewpoint.

Visual Absorption Capability (VAC) The capability of the landscape to visually absorb management activities. Landscapes are rated with high, moderate or low abilities to absorb management activities. These ratings reflect the degree of landscape variety in an area, viewing distance and topographic characteristics. As an example, steep, evenly sloped landscapes viewed in the foreground to middleground are typically given a low VAC rating.

Visual Quality Objective (VQO) A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

- **Inventory VQO** Derived through application of the USDA Visual Management System. Uses three elements to determine the inventory: Sensitivity levels, distance zones and landscape variety class. Provides a benchmark and illustrates the optimum objective based on current use patterns and sensitivity.

- **Adopted VQO** The VQO to be achieved as a result of management direction identified in the approved forest plan. Adopted VQO's represent the visual resource objective for the Forest Land Management Plan period, normally 10 years. (FSH 2309.22, R-10 Landscape Management Handbook.)

- **Preservation** Management activities are generally not allowed in this setting. The landscape is allowed to evolve naturally.

- **Retention** Management activities are not evident to the casual Forest visitor.

- **Partial Retention** Management activities may be evident, but are subordinate to the characteristic landscape.

- **Modification** Management activities may dominate the characteristic landscape but will, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed as middleground (1/4 to 5 miles from viewer).

- **Maximum Modification** Management activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

VQO See Visual Quality Objective.

W

WAA — See Wildlife Analysis Area.

Watershed — The area that contributes water to a drainage or stream. Portion of the forest in which all surface water drains to a common point. Watersheds can range from a few tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

Third order watershed — A watershed where there are (generally) two major branches to the mainstream of the watershed. (Also see Stream order.)

Fourth order watershed — A watershed which contains at least two third order watersheds.

Water table — The upper surface of the ground water or that level below which the soil is saturated with water.

Well-drained soils — Water is removed from the soil readily, but not rapidly.

Wetlands — Areas that are inundated by surface or ground water with a frequency sufficient, under normal circumstances, to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include muskegs, marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs.

WFUD — See Wildlife and Fish User Day.

Wild and Scenic Rivers — Rivers or sections of rivers designated by congressional actions under the 1968 Wild and Scenic Rivers Act, as wild, scenic, or recreational by an act of the Legislature of the State or States through which they flow. Wild and scenic rivers may be classified and administered under one or more of the following categories:

Wild river areas — Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

Scenic river areas — Rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Recreational river areas — Rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wilderness — Areas designated by congressional action under the 1964 Wilderness Act or subsequent Acts. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historic value as well as ecologic and geologic interest. In Alaska, Wilderness has been designated by ANILCA and TTRA.

Wildfire

Any wildland fire not designated and managed as a prescribed fire within an approved prescription. All wildfires will be given an appropriate suppression action.

Wildlife Analysis Area (WAA)

A division of land used by the Alaska Department of Fish and Game for wildlife analysis.

Wildlife and Fish User Day (WFUD)

One Wildlife and Fish User Day (WFUD) consists of 12 hours of recreation viewing or utilizing fish or wildlife.

Wildlife habitat diversity

The distribution and abundance of different plant and animal communities and species within a specific area.

Windfirm

Trees not likely to be blown over by the wind. These are usually trees that have been exposed to the wind throughout their life and have developed a strong root system or trees that are protected from the wind by terrain features.

Windthrow

The act of trees being uprooted by the wind. In Southeast Alaska, Sitka spruce and hemlock trees are shallow rooted and susceptible to windthrow. There are generally three types of windthrow - endemic where individual trees are blown over; catastrophic where a major windstorm can destroy hundreds of acres; and management related, where the clearing of trees in an area make the adjacent standing trees vulnerable to windthrow.

Winter range

An area, usually at lower elevation, used by big game during the winter months; usually smaller and better-defined than summer ranges.

Withdrawal

The withholding of an area of Federal land from settlement, sale, location, or entry under some or all of the general land laws for the purpose of limiting activities under those laws in order to maintain other public values in the area.

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